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MAJOR SHIFTS IN WORLD AGRICULTURE

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IN WARTIME a nation's agricultural production, like all other phases of its economy, must undergo extensive change. The area of conflict in World War II as well as the restrictions to world trade have been much greater than in World War I. There also has been a more concerted effort to pool the food needs and resources of the Allies and their armies in order to save shipping space. As a result the adjustments to agricultural production in the different areas of the world have been much greater in this war and it is probable that the necessary postwar adjustments also may be much greater.

The shifts in agricultural production in most countries were made shortly after the war cut off foreign supplies. In European countries and the United Kingdom, the adjustments were made largely from 1939 to 1941, in the Americas and the Asiatic area changes were more pronounced between 1941 and 1943. In a few countries the trends of the early war years continued into 1944 and 1945. On the other hand, there were instances where the shifts in production of some products were found to be too great and changes have been made back toward the prewar pattern of production. A comparison of 1943 and 1944 production in the different areas of the world, however, with that in the years immediately preceding the war roughly measures the extent of the wartime shifts in agricultural production.

Because of the importance of an adequate food supply in wartime, most of the adjustments in agricultural production have been pointed toward increasing the output of food products. In countries where available crop land is scarce, such as Egypt, India and Japan the production of industrial crops was decreased in order that the output of food crops could be increased.

The production of industrial crops also has been restricted to some extent in other countries by the lack of transportation facilities for world trade. There are a few countries, however, which have continued to expand the production of cotton and other industrial crops, especially rubber, cinchona bark and other products essential to carrying on the war.

Wartime Changes in World Food Production

The world's total food production, measured in caloric value of farm output, has increased since the outbreak of the war but the relative gain has not exceeded the estimated increase in the world's population. In North America, the farm production of food in 1943 and 1944 averaged 32 percent greater than in the 5-year period immediately preceding the war. During a corresponding period food production in South America increased 16 percent. In the Asiatic areas there were significant changes in the production of individual products but the over-all increase in food output was slight. On the other hand, production of nearly all types of products in western Europe and North Africa was below prewar and in Oceania production has been considerably reduced by droughts and shortage of labor.

These estimated changes in food production are based upon a study of wartime changes in production in 30 countries to determine the influence of the war upon the world food supply. These countries have about 60 percent of the world's population. Conclusions reached from an analysis of these countries were checked against changes in world production of 5 leading food crops which provide about 50 percent of the world's food supply in calories.[1]

In some of the areas not covered in this study, including the war-torn parts of the Soviet Union, occupied China and the Dutch East Indies, the decline in food production was probably greater than in some of the countries studied, but available data are too incomplete to measure it. On the other hand, there have been marked increases in food production in many parts of the world which could not be included in this study as well as in the production of minor products for which estimates of production are available in only

[1] See "Wartime Changes in World Food Production"—Office of Foreign Agricultural Relations, December 1944, for discussion of the problems of measuring food production in different countries and the reliability of available data for different areas of the world.

relatively few countries. Consequently, the study of the 30 countries is believed to present a reasonably accurate picture of the over-all food output on the farms of the world since the war began.

The level of food production in 1943 and 1944 is summarized by major geographic regions and by types of commodities in the accompanying table. The average production of 2 years was used to

WORLD FOOD PRODUCTION BY MAJOR GEOGRAPHIC REGIONS AND BY TYPE OF PRODUCT

Average of production in 1943 and 1944 as a percentage of prewar period[1]

Type of product	North[2] America	South America	Western Europe and North Africa	Middle East	Oceania and South Africa	Southern and eastern Asia	All Countries[3]
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Crops:							
Cereals	128	94	98	106	70	103	105
Fruits and vegetables	121	130	104	86	117	101	108
Edible oils	154	375	102	69	—[4]	114	125
Sugar	95	128	82	115	99	105	99
Total	127	115	97	100	78	104	106
Livestock products:							
Meat, poultry, and eggs	159	121	61	91	119	64[5]	107
Dairy products	119	122	90	78	96	98	102
Total	142	122	74	86	109	91	105
Grand total	132	116	91	99	86	103	105

[1] Production measured in calories for 30 countries. The average of 1943 and 1944 is expressed as a percentage of prewar base. The prewar average differs slightly by countries because of lack of comparable data or in order to obtain a normal period of prewar production. For most countries the prewar average was 1933–37, 1934–38 or 1935–39.

[2] The high level of the index of production in North America results in part from the influence of the severe droughts of 1934 and 1936 on agricultural production in the base period. However, production of crops in 1943–44 averaged 11 percent more than in the relatively favorable year 1939, while livestock production was 27 percent higher and total production was up 18 percent.

[3] The countries included in the various regions are as follows:
North America—Canada, United States, and Mexico.
South America—Brazil, Uruguay, Argentina, and Chile.
Western Europe and North Africa—United Kingdom, Eire, Norway, Sweden, Denmark, Germany, France, Italy, Spain, Tunisia, Algeria, and French Morocco.
Middle East—Egypt, Palestine, Turkey, Greece, and Bulgaria.
Oceania and South Africa—Australia, New Zealand, and Union of South Africa.
Southern and eastern Asia—India, Unoccupied China, and Japan.

[4] Production insignificant.

[5] Production of Japan only, including fish.

measure shifts in production from the prewar period in order to minimize fluctuations resulting from unusual crop yields in an individual year. The most outstanding regional increase in food production occurred in North America with sharp advances in the output of edible oils, meats, and dairy products and significant increases in all other types of products. The greatest proportionate increase occurred in the edible oil crops of South America where an acute shortage developed after the Pacific war shut off supplies from eastern Asia and the East Indies. Among the individual countries the highest proportionate increases in production, measured in calories, occurred in Norway and the United Kingdom.

The changes in total production by type of product show a marked shift in the general pattern of agricultural output in the different parts of the world. In countries and regions that normally produce less food than they consume, western Europe for example, food crops have been increased while production of fodder crops and livestock were decreased. By shifting from animal products to food crops, these countries could more nearly meet the caloric requirements of their people from available agricultural resources. On the other hand, the surplus producing regions, especially North America, strongly emphasized the production of livestock products but the output of food crops increased almost as much as the output of livestock products. Therefore, it was possible to supply the overseas forces, the United Kingdom, and the Soviet Union with large quantities of animal products in processed and concentrated form with economy of shipping as well as maintain home supplies.

The amount of cereals used for food has increased more since the war began than the production of cereal crops as a whole. In many countries, a larger proportion of the wheat crop has been used for cereals. This was particularly true in the United Kingdom and other countries in western Europe. Also more coarse cereals have been mixed with wheat and rye flour or used in other ways as food in order to extend the available supplies of cereals.

The combination of fruits and vegetables into a single group is not entirely satisfactory, particularly for measuring the changes in production over a short period of time, as the supplies of vegetables can be increased much more quickly than the supply of fruits. Insufficient data are available to make a more detailed breakdown of these products; however, when measured in calories they provide a relatively small proportion of the total food supply. The wartime

increase in the production of fruits and vegetables, as shown in the table, largely reflects the expansion in the potato, sweet potato, mandioca and pulse crops. There has also been an increase in the proportion of the potato crop used as food, particularly in European countries. In the last two years production has been considerably below prewar due to poor yields, but the actual quantities used as food were only slightly reduced.

The increase in the world production of edible oil crops probably was considerably less than is indicated in the accompanying table. About one-third of the total supply of vegetable oils is normally obtained from Manchuria, the Dutch East Indies, and other southeastern Asiatic areas and these areas were under Japanese control in 1943 and 1944. The loss of surplus supplies from these areas and the almost complete cessation of whale fishing were the principal factors which stimulated the marked expansion in oil production in the other parts of the world. While no quantitative data are available in the production of edible oils in the Japanese controlled areas, it is believed that there has been a substantial decline in output during the war.

The shifts in world sugar production in response to the war also are only partially reflected in the analysis of the 30 countries studied. While total sugar production in North American countries studied has declined during the war, this decline has been more than offset by the increase in Cuba and some of the other Caribbean Islands. In South America, most of the increase was in Brazil. Sugar production in western Europe has been reduced only about 18 percent from prewar levels but production in the Soviet Union and some of the other eastern European countries is believed to have been reduced even more by the war. In the Middle East the 15 percent increase in production was largely in Turkey and Egypt. The 5 percent increase in southern and eastern Asia largely reflects the increase of the sugar production in India and does not include the marked declines which are believed to have occurred in the Dutch East Indies and the Philippine Islands.

The sharp reduction in the production of livestock products in the European area is probably the most significant shift made in agricultural production in response to the war. Because of their greater dependence upon concentrated feedstuffs the numbers of hogs and chickens were reduced most. The cattle number, particularly dairy cattle, was reduced only moderately but milk production

has been reduced because of the lack of concentrate feeds. However, the sharp reduction in the production of livestock and livestock products in this area and the more moderate reductions in the Middle East and in Asia have been more than offset by the expansion of output in other areas where production could be measured and total production in the areas studied in 1943 and 1944 averaged 7 percent more than in prewar.

Even if allowance is made for the limitations of the statistics used in measuring the changes of food production by regions they clearly show that marked increases have occurred in some areas during the war years which have been offset in a large part by decreases in other areas. The net result has been an increase in the world's farm production of food but this increase is probably no more than sufficient to keep pace with the estimated increase in world population.

The Probable Influence of Wartime Shifts Upon Postwar Agriculture

Two dominant characteristics of the agricultural industry should be stressed before examining the wartime shifts in more detail. In areas where production is temporarily restricted there is the tendency for total output to return to normal. On the other hand, once production has been increased, the tendency is to maintain the increase. These tendencies were clearly shown after the last war.

Although agricultural production in Europe declined to only about 70 percent of prewar in 1919, it was back to prewar levels by 1925. In the decade before the present war, domestic food production in Europe was encouraged by increasing tariffs, by placing restrictions on imports, or by other types of assistance so that agricultural production at the beginning of the present war was at an unusually high level. The decline in production through 1944 was much less than in the last war, but the strain of war was apparent. During the past year much of Europe has been severely devastated and it now appears that damage to facilities for transporting, storing and processing agricultural products has been or will be much greater and more widespread than it was in the last war. This will, no doubt, greatly retard the rate of recovery in agricultural production. The speed with which European agriculture recovers also will depend, to some extent, on the final peace settlement and the postwar political situation in Europe. The significant point is, however, that a substantial recovery in production is probable, not only in Europe but also in the other devastated areas.

The characteristic of the agricultural industry to maintain expansion in output also was demonstrated after the last war when the expansion in agricultural production in Canada, Australia, Argentina and the United States was maintained despite the sharp drop in prices after 1920. Therefore, as the areas where production has been interrupted by the war begin their return to normal, it is doubtful if production in areas where expansion has occurred will be reduced appreciably, or at any rate for sometime.

Shifts in Production by Regions

North America: Since the war began all of the countries of North America have greatly increased their agricultural production. In Canada and the United States, production has been stimulated by guaranteeing minimum prices by payment of subsidies and by other assistance programs. In Mexico and most Central American countries, the expansion has been largely in response to higher prices although the government has directed production toward most urgently needed products. The United States guarantee of a market for the entire crop of Cuban sugar was accompanied by an expansion in the acreage of sugar cane cut of about 40 percent.

Very few, if any, of the countries in this area were using their agricultural resources at full capacity when the war began. Moreover, the continent has been favored with better than average weather conditions during the war years. It is impossible to separate the increase in output in the United States and Canada between the influence of government aid, the response to higher prices and the favorable weather, but government aid probably has been more influential in directing the increase in production toward certain products than it has in stimulating an over-all increase in production.

In Canada, better than average yields maintained wheat production at about prewar levels in 1943 and 1944 despite a sharp drop in acreage. Most of the acreage shifted from wheat was diverted to feed grains which permitted Canada to increase its production of hogs, dairy products and eggs, in order to meet the increased demands of Great Britain and other Allied nations. In the two years, 1943 and 1944, production of hogs averaged nearly two and one-half times that of prewar, beef production was up nearly 40 percent, cheese production 40 percent and egg production 64 percent. No doubt there will be some shift back to wheat in the postwar

period providing a market is available for any additional quantities of wheat at satisfactory prices, but part of the expansion in the production of livestock and livestock products is likely to be maintained in postwar agricultural programs.

In recent declarations on postwar programs Canadian government officials have often emphasized the need for Canada to maintain a large volume of agricultural exports in postwar. Several government programs have been adopted to increase the quality of livestock products produced for export in Canada and to advertise the high quality of its products. As a step in maintaining exports, contracts have been made with the United Kingdom which assure Canadian farmers of a market for all of the meats, cheese and eggs they can produce through 1946.

The expansion in agricultural production of about one-third in the United States and the shift to oil crops, meat animals, and eggs is well known. The expansion of food production in Mexico has been about as great as in the United States and the percentage increase in oil crop production has been much greater. Edible fats are the principal food imports of Mexico and with the outbreak of the war in the Pacific, the supply of fats was largely cut off. Under government sponsorship the output of peanuts, sesame seeds and cacao beans has been expanded sharply and a larger proportion of the cotton seed has been crushed for oil. In 1943 and 1944 these products supplied more than three times as much edible oil as they did in the prewar. There has also been a sharp expansion in the production of vegetables for home consumption and for shipment to the United States while sugar production in recent years has been over 50 percent larger than it was in prewar.

South America: The upward trend in agricultural production in South America has been greater since the war began than it was in prewar years and no doubt, the increase would have been even more pronounced if machinery and other needed facilities had been readily available. There also have been marked changes in the trends of production of individual products. Before the war, South American countries were large exporters of grains, beef, wool, mutton and lamb, coffee, cotton, and tropical fruits and nuts. Large quantities of edible oils were imported and the continent as a whole was a net importer of rice. The blockade of Europe and the shortage of shipping, resulting from the war has sharply reduced the exports of grains, fruits, cotton and coffee, but there has been an active

demand for meats and dairy products, and in Argentina particularly, there has been a marked expansion in the production of these products. In 1943 and 1944 the production of pork products in Argentina averaged nearly three times as much as in prewar, mutton and lamb production was up 80 percent, cheese production doubled and butter production was up 50 percent. In Brazil also, there was a marked increase in the production of pork.

To offset the loss of olive oil from the Mediterranean area and vegetable oils from southeastern Asia, several countries greatly expanded the production of peanuts and sunflower seed and increased the quantity of cotton seed crushed. During the last 2 years, production of edible oil seeds in Argentina has been 4 to 5 times as large as in the prewar period and the percentage increase of these products in Uruguay has been even more phenomenal. In Brazil, vegetable oil production was expanded by crushing a larger percentage of the cotton seed crop. As a result of these increases, South American countries have not only met their domestic requirements but have been net exporters of edible oils since 1942.

An expansion in rice production has been general in all countries. Rice production in Brazil, the principal producing state, has increased nearly 50 percent since the war began. Some of the smaller countries have had much larger percentage increases, and the continent as a whole is now a net exporter of rice.

The outlet for coffee from South American countries has been restricted by the blockade of Europe but four successive short crops have enabled Brazil to dispose of a large part of her surplus coffee supplies. Cotton production in Brazil and Argentina has continued to expand and textile production in these countries has expanded sharply during the war years. They both are now exporting considerable quantities of textile products in addition to meeting most of their domestic requirements.

Many of these wartime shifts in South American agriculture have been very beneficial to the agricultural economy and will continue after the war. Several countries have been encouraging greater self-sufficiency in food products for many years and the war has accelerated such programs. It is probable that attempts will be made to maintain a large part of the total expansion which has occurred during the war as well as the shift to the production of livestock and livestock products. Special efforts are being made to improve the quality of products for export.

Several countries have experienced a marked expansion in industrial activity and mining during the war years which has been accompanied by increased domestic consumption of dairy products, meats and rice. This is illustrated by the sharp increase in the consumption of meat in Brazil. Before the war, Brazil was an exporter of beef. While production of beef has been maintained at near prewar levels and production of other meats has expanded, beef exports not only have been restricted but it has been necessary to ration existing supplies in order to prevent sharp price advances. The marked increase in Brazilian rice production also has been largely retained for domestic consumption.

The United Kingdom: The United Kingdom is the principal importer of food products and its post war policy on agricultural production will have an important bearing on volume of international trade in food products. During the war, agricultural production in the United Kingdom has expanded sharply, much more than in World War I. The full extent of the increase is difficult to measure because of the practice in the prewar period of importing both feeder livestock and feedstuffs and extensively using the land as permanent pasture.

During the war, the acreage in cultivation has increased about 50 percent. The importation of feedstuffs has been confined to the by-products of imported feedgrains and oil seeds and imports of feeder cattle also have been reduced somewhat. By using more of the home produced grains for food, expanding the production of potatoes, sugar beets, fresh vegetables and fluid milk and sharply reducing the production of meats, eggs, and butter, the gross output from farms of the United Kingcom, in terms of calories, has expanded about 45 percent. However, if allowance is made for the smaller imports of feeds and cattle, the net output of the United Kingdom farmers in 1943 and 1944 was about 70 per cent more than in prewar years.

As a result of the sharp increase in production, the proportion of food requirements furnished from home grown production increased from about 30 percent of the caloric requirements in the prewar period to more than 50 percent in 1943. It is maintained by farmers of the United Kingdom that the expansion to meet wartime needs has been carried beyond what appears desirable for a long-time program and some shift back to livestock production appears likely in postwar years.

The United Kingdom has not announced a definite long-time policy for postwar agricultural production. The government has maintained, however, that the expansion and improvement in British agriculture must be continued after the war. A four-year plan for agriculture has been proposed which includes assured prices for agricultural products through the crop years 1947–48. During this four-year period it is planned that the character of agricultural production will be changed to adjust the use of agricultural land to the production of foodstuffs which it is best fitted to produce and which are most required to satisfy nutritional needs.

Continental Europe: In the prewar years continental Europe, excluding Russia, also was a large net importer of food products. Imports, including food produced from imported feedstuffs, provided about 10 percent of the total prewar food consumption. With the blockade of Europe, foreign supplies of food and feedstuffs were largely cut off and European countries made such shifts in agricultural production as would provide a maximum of foodstuffs. Considering the general shortage of fertilizers, labor, equipment, and other essentials of production, the over-all farm output of farm products, in terms of calories, was well maintained. Production of meats and eggs was drastically reduced, and a larger proportion of the total output of crops was used for food. Because of the acute shortage of fats, special efforts were made to expand the production of oil crops.

In the two years 1943 and 1944, the total output of cereals for food in western continental Europe averaged about 92 percent of prewar, sugar crops about 77 percent, fruits and vegetables (mainly potatoes) 97 percent, and oil crops 105 percent. The total production of crops was about 92 percent of prewar, but the production of meats and eggs was only 60 percent while dairy products were over 85 percent of the 1933–37 average. The total farm output of all farm products was about 86 percent of the prewar average but the decline in total calories used for food was much less because of economies introduced in the processing and utilization of food products. For example, the milling extraction rate of wheat and rye in many countries has been increased from about 75 percent before the war to more than 90 percent.

Data are not available for measuring the changes in food production in the eastern European countries since the war began. Indications are, however, that the decline in production in Greece was

much greater than in western Europe whereas in other Balkan countries it was much less.

Most of the shifts in food production in European countries were made from 1939 through 1941. In the years 1940 and 1941, crop production in Europe generally was reduced by drought and livestock numbers had to be drastically reduced because of shortages of feed. While livestock numbers have continued to decline in some countries since 1941 there has been an increase in several countries, particularly Sweden and Denmark. During 1942 and 1943 there was relatively little actual fighting in continental European countries and production was relatively stable. However, since the early part of 1944, a large part of this area has been devastated by war. Production in 1944 was less than in 1943 and the increased devastation is likely to be reflected in still lower food production in 1945. In large areas many farmers have abandoned their farms, work stock has been slaughtered or driven off, equipment destroyed, and buildings burned by retreating or invading armies. Even in many areas where farmers remained they hesitate to continue normal production as bridges, roads and boats have been destroyed so that means of transportation for marketing farm products are not available. Moreover, the value of money is uncertain and consumer goods are unavailable so that there is little incentive for farmers to produce more than they need for their own use or can sell locally.

Until the means of transportation and exchange can be improved it will be difficult to enforce collections from farmers or to encourage farmers to expand production. On the other hand, shipping space for imports will be at a premium as long as the war in either area continues. This will increase the need for Europeans expanding food production as rapidly as possible after hostilities cease. There will also be a shortage of foreign exchange in European countries for the purchase of imports so that unless food products are furnished in the form of relief or extensive loans are made to those countries, a shortage of food is probable until they can again increase agricultural production.

Trade policies adopted after the war by European countries as well as by countries having agricultural products for export also will influence the trend of production of different farm products in European countries. Political boundaries established after the war and the type of reparation payments imposed upon the Axis nations likewise will influence agricultural production and trade for

several years in the postwar period. During the period of increasing self-sufficiency before the war, many countries encouraged the production of food products even when their production was relatively uneconomical, An expansion of foreign trade after the war might result in a considerable shift in production of individual products when compared with prewar. Regardless of the trend of output of different products, however, it is apparent that a significant expansion in food production is likely to take place as soon as facilities for production and transportation can be repaired.

The Soviet Union: At the height of the German invasion, about 40 percent of the more productive crop land of the Soviet Union was occupied by Germany. By the later part of 1944 all of the prewar Russian territory had been reoccupied and steps taken to repair the devastation caused by war. There is, however, a considerable time gap between liberation and the recovery of agricultural production. The shortage of draft power in the liberated areas is very severe. The number of tractors in the Ukraine decreased by almost 60 percent during the period of German occupation. Still, in the areas previously occupied by the Germans, about two-thirds of the prewar acreage was planted to crops in 1944. By the end of 1944 much progress had been made in repairing farm buildings, repairing farm machinery and reestablishing agricultural production in the occupied areas. Some factories have been converted to the manufacture of tractors and other urgently needed farm equipment. There was also some restocking of livestock from herds of the unoccupied areas but considerable time will be required to restore the severe livestock losses of the liberated regions. Despite the progress made in the past year, it is probable that several years will be required to expand production, particularly of livestock, to prewar levels. During this period at least, practically all of the agricultural products produced in Russia will be required for home use.

Australia, New Zealand and South Africa: The output of food products in the British Dominions of the southern hemisphere—New Zealand, Australia and the Union of South Africa—has been greatly affected by the war. During the first two years of the European war the demand for the export products of these areas was reduced because of the shortage of shipping space. However, with the outbreak of the Pacific war, the demand for Australia and New Zealand's food output increased sharply and supplies from South

Africa were important in reprovisioning ships engaged in hauling materials to the Pacific war zone.

When troops were stationed in the southwest Pacific, surplus food supplies in this area were soon exhausted and marked shifts in production were undertaken to provide troops with fresh vegetables, dairy products, and meats from Australia and New Zealand. The efforts to expand agricultural production in these countries, however, have been handicapped by the shortage of labor and unfavorable weather conditions. In 1943–44 total production was slightly below prewar and production in 1944–45 has been further reduced by a serious drought in Australia. Agricultural production in South Africa during the past two years also has been reduced by an extensive drought.

There is evidence that agricultural production will expand again in this area as soon as labor and materials needed for production become available. In New Zealand the labor shortage has been relieved somewhat in recent months by the release of some agricultural workers from military service. This was followed by a sharp increase in dairy production. Because of the great wartime need for livestock and livestock products, agricultural production in these areas has been directed toward expanding the output of these products. In Australia, farmers have been encouraged to increase pork production in order to use up the surplus supplies of wheat and during the past two years hog slaughter has been about 70 percent above prewar. The production of butter in Australia has declined since the war began, but cheese production has increased about as much as pork production. There also has been a marked expansion in the production of vegetables in some of the irrigated districts of Australia and processing plants have been established in these areas during the war period.

Both Australia and New Zealand are interested in maintaining a high level of livestock production after the war and have entered into postwar trade agreements with the United Kingdom. The agreement with Australia gives assurance that all exportable surpluses of dairy and meat products will be taken for a period of four years from October 1, 1944. Prices are subject to review at the end of two years at the request of either government. A similar four-year contract has been made between the United Kingdom and New Zealand providing for some increase in the price of meat and covering all New Zealand surpluses available for export.

Asia: About one-half of the world's population live in Asia, south of the Soviet Union, and the East Indies. While this area exports a large part of the tea, rice, edible oils, sugar, rubber, and silk entering into world trade, the amount exported makes up a very small part of the total agricultural production. Imports of agricultural products into this area also are relatively small so that this large population is primarily dependent upon production within the area. During the war years, production in this area has tended to average below the prewar level, particularly in the occupied areas. In the unoccupied areas of China, food production has been below prewar since 1939, except in 1944 when crop conditions were unusually good and total production was about as high as in any year since the war began. In Japan and Korea, there has been some decline in agricultural production since 1942 because of the shortage of labor and fertilizer and some further decline in production is in prospect for 1945. The fish catch in Japan also has been much smaller and food supplies available for consumption have continued to decline despite the large surplus producing areas under Japanese control.

Shifts in food production in China and India, in response to the war, have been minor and are not likely to affect the postwar food supply. India has expanded the acreage of rice and coarse cereals somewhat in an attempt to offset the loss of rice imports from Burma. Some expansion in food production possibly will occur in China and Japan when the war is over and fertilizer materials from foreign countries are again available. The production of rice, sugar and vegetable oils in the surplus producing areas under Japanese control is believed to have declined substantially since 1941, the last year for which data are available. However, these areas may be brought back to normal production within a relatively short time, once they are in a position to export their surplus products to the outside world.

Postwar Prospects for Agricultural Production. The wartime shifts in agricultural production and trade agreements already made which are likely to affect postwar agricultural production indicate that efforts will be made to maintain a large part of the increases which have occurred in agricultural output during the war. There also are indications that many countries which were important importers of agricultural products before the war will strive to maintain or to increase their agricultural production in order to conserve foreign exchange.

These major changes in the levels of production will no doubt create many problems in adjustment of production and trade during the postwar period. It is possible that the problems of adjustment will be further aggravated by a reduction in the present strong demand for agricultural products. The decline in military demands may be offset only partially by increased civilian consumption even if there is a sustained high level of industrial activity throughout the world, as the per capita consumption of many commodities by persons in the armed services is much higher than the consumption by civilians. This is particularly true of meats, and several other types of livestock products. There will also be increased competition by industrial products for such foreign exchange as is available which may reduce the demand for agricultural products in world trade. It therefore appears that during the readjustment period at least, surpluses of some products are inevitable. Unless consumption habits are changed materially in the postwar period, the greatest surpluses will probably occur in those products which have shown the most expansion such as edible oils, pork and eggs, and to a lesser extent, sugar and rice.

Although agricultural production may increase more rapidly than the population in postwar years, this may not necessarily lead to continued over production as the over-all level of food production will still be below the requirements necessary to provide an adequate diet for the world's population. In the prewar period there were several areas of the world where large portions of the population were under nourished and where the diet was poorly balanced. Consequently, whether or not we will be able to utilize a higher level of production in postwar will depend, to a large extent, on our ability to overcome the problems of distribution. If a more equal distribution of food products could be assured, agricultural production could be expanded substantially over present levels without creating surpluses.

AGRICULTURAL PRODUCTION AFTER THE WAR

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TODAY the war situation requires continued all-out effort in food production, but tomorrow food needs for war and war relief may begin to taper off. Then we shall need to make a transition from wartime requirements to peacetime market demands; and when that transition is completed, our supplies of food and fiber will need to find peacetime market outlets in this country and abroad. This discussion deals largely with the years beyond the immediate transition period, but obviously what happens between now and then will influence the situation in later years.

The beginning of the transition from war to peace in agriculture will find our production plant geared for high production, with farm products selling at high prices and net income to farmers nearly three times the level of the prewar years 1935–39. In 1944 the volume of farm production for sale and for use in the farm home averaged a third higher than in the prewar years 1935–39. We need to understand how this unprecedented increase came about in order to make an appraisal of the level of production we are most likely to have when the war is over, and to analyze the problems that may confront us at that time.

Wartime Increases Are the Joint Product of Several Factors

Some comments on the wartime increases in production have implied that it is almost entirely due to favorable weather. It is true that, from a national standpoint, weather has been relatively favorable to farm production in the war years 1940–44. But a careful analysis of the factors involved indicates that not more than one-fourth of the increase in output can be attributed to better than average weather. This estimate includes an evaluation of the effect of larger feed and pasture supplies on livestock production, as well as the increased crop yields.

With allowance for average weather, farm production at the end of the war will be at levels 25 to 30 percent above the average of 1935–39. This means that other factors than weather explain most

* This statement presents only the author's personal viewpoint on the problems that are considered.

of the wartime increase in output. The more important ones are: (1) shifts from animal to tractor power, (2) increased use of fertilizer and lime, (3) improved crop varieties, (4) increased use of cover crops and other conservation practices, (5) pest and disease control, (6) better feeding of livestock, (7) shifting to more intertilled and more productive crops, and (8) a small increase in the area of land used for crops.

Farmers have combined these forces in their production programs, with the result that we have experienced an agricultural revolution that could not have been predicted from past production trends. Progress in the use of improved practices over a period of years had built up a potential production capacity at the outbreak of World War II that was harnessed by the driving force of the need for increased food, and spurred on by the financial and patriotic incentives to increase output.

A few concrete illustrations will indicate the departures from prewar standards. Use of commercial fertilizer plant nutrients in 1944 was 85 per cent higher than in the prewar years 1935–39. Application of lime nearly tripled in the same period. The acreage of winter cover crops was more than tripled, and other conservation practices made important contributions to increased yields. Adoption of improved varieties was an important factor. Hybrid seed increased corn yields in the Corn Belt nearly 20 percent.

The wartime shift to more intertilled crops, such as soybeans, peanuts, and corn, has resulted in a larger farm output. In many instances, however, the average yield per acre of the strategic war crops was lower than it would have been on the prewar acreage, because the additional acreage was on land not well suited to those crops, and grown by farmers who had little experience in producing them. The area in intertilled crops increased about 8 million acres from the average of 1935–39 to 1944. Total land used for crops increased about 11 million acres, with about an offsetting reduction in summer fallow, idle, and pasture land.

Ever since World War I, there has been a gradual shifting from grass hay to legume hay. When the result of this change is analyzed in terms of the increased quantity of digestible proteins in the total hay supply, it shows one of the most startling changes in the entire production picture. The pronounced shift to legume hay, and the moderate increase in hay acreage in the war years 1940–44, as compared with 20 years ago (1920–24) shows an increase of

nearly 75 percent in the total digestible proteins available from hay per animal unit of cattle and sheep.[1] This means that important progress has been made toward more adequate balancing of rations for roughage-consuming animals.

Despite the tightening of concentrate feed supplies during the past year, which caused a reduction in livestock production from the high levels reached in 1943–44, livestock output is still above prewar levels. Some of the increase has been achieved by feeding accumulated reserves of both domestic wheat and feed grains, and by the larger imports of grains. But in the feeding year ending October 1944, these two sources accounted for only about 10 percent of the total concentrates fed to livestock. Therefore, by far the larger proportion of the increase in livestock production has been obtained from current production of grain, hay, and pasture. Total consumption of high protein feeds in the war years has averaged 5 percent higher per livestock unit than in prewar years, despite the difficulties experienced in obtaining protein feeds. Better balanced feed supplies of both roughages and concentrates have added considerably to the livestock output.

One of the most important factors in increasing the output of farm products for market is the shift to mechanical power that has taken place since World War I. In the years since 1920, about 50 to 55 million acres of cropland (and many million acres of pasture) have been released from the production of feed for horses and mules on farms and in cities, and made available for production for the market. The shift to mechanical power on farms accounts for the major part of the increase in production for sale from 1920 to the beginning of World War II. In one sense this is not an actual increase in farm production, but rather a shift from producing power on the farm to buying power and producing additional products for the market.

Mechanical power and labor-saving machinery also contribute to timeliness in farm operations. Under certain weather conditions this becomes extremely important. Undoubtedly both corn and soybean yields were higher in the Corn Belt in 1943 and 1944 because farmers had sufficient power to plant and cultivate promptly after the late spring rains.

The record breaking farm output of 1944 was produced with 8

[1] See Bureau of Agricultural Economics processed report "Changes in Hay Production in War and Peace," by Neil W. Johnson.

percent fewer workers on farms than in 1935–39. Furthermore, many of the workers in 1944 had less strength and skill than those normally employed on farms. If allowance is made for this factor, the effective labor force was nearly 15 percent smaller than in 1935–39. But, by working longer hours and more days per year, by taking advantage of mechanization and other improved practices, and because of the decreased amount of labor per bushel or per head as output was increased, the output for market per worker was pushed up to over 40 percent above prewar levels.

Wartime Increases Will Persist

Analysis of the forces back of increased wartime production indicates that many of these factors will persist when the war is over. Some of them, in fact, will be greatly accentuated. Farmers will not want to work so hard, but more workers will be available. For at least two years after machinery becomes freely available for purchase, farmers are likely to buy new tractors and complementary equipment in greater quantity than ever before. This means that the rapid rate of mechanization that was experienced in the late 1930's is likely to be resumed, and even accelerated. Substitution of tractors for work animals may release 5 to 10 million acres of cropland by 1950. Crop yields may also be increased because of more thorough tillage and timely performance of crop operations.

In the war years commercial fertilizer has been used in areas and on crops where there has been little if any previous use. This means that many more farmers have had experience in using fertilizer under a greater variety of conditions, and it is reasonable to assume that they will want to continue using fertilizer at a high level. Use of commercial fertilizer increased 70 percent in terms of plant nutrients from the close of World War I to 1930. And the 1920's were not considered especially favorable years for farmers.

In a recent State and Federal cooperative study of production adjustments in the postwar period, committees of agronomists, economists, and other agricultural workers estimated the amount of fertilizer that it would *pay farmers to use under prosperity conditions*. A preliminary tabulation for the entire country indicates that in terms of total plant nutrients these estimates are approximately double the large quantity used in 1944, and almost four times the average consumption of the prewar years 1935–39. It should be understood, of course, that these estimates are not in terms of past

relationships between farm income and fertilizer purchases—even under prosperity conditions—but rather in terms of what it would *pay* farmers to use. Educational and other programs would be needed to close the gap between what farmers ordinarily would buy, and what it would pay them to use. Nevertheless, this estimate and past experience both indicate that we should not expect the influence of increased use of fertilizer to disappear when the war is over. Similar statements can be made with respect to lime, winter cover crops, and other soil conserving practices.

The longer time effects of adoption of improved varieties seem to have a tendency to level off, except for such startling innovations as hybrid seed corn. However, the possibility of similar developments in other crops should not be overlooked. For example, the Lincoln soybean seems to promise yields 20 percent higher than the varieties now in use. Of course, it is necessary to realize that higher yielding crop varieties also mean greater drains on soil fertility, which need to be compensated by better rotations and increased use of manure, commercial fertilizer and lime.

After the war some new land will be brought into production regardless of economic conditions. In fact, an increase of 4 to 5 million acres is indicated from the irrigation, drainage, and land clearing activities already under way, but unless development is greatly accelerated, new land will not result in a large increase in production.

On the livestock side, better breeding, especially of dairy and poultry, may result in small increases per animal, but more immediately important will be the effect of more abundant and higher quality feed supplies—concentrates, hay and pasture—and more progress in the feeding of balanced rations.

In this picture of forces pushing toward increased production after the war there are some offsetting factors. The wartime acreage of intertilled crops is larger than can be continued in systems of farming that will maintain or improve soil resources. Although a shift from corn and soybeans to small grains, hay and pasture results in some decrease in output in most areas, the necessary shifts in this direction will not greatly affect total output. There also will be need for restoring some land to permanent grass cover, and this too will tend to reduce output, but only to a very small extent.

A balancing of the forces pushing toward increased production after the war, against those that will tend to reduce output, indi-

cates that those operating on the increase side are much stronger than those on the decrease side. In fact, it seems possible that if farm incomes are fairly satisfactory in the immediate postwar years, production for market might push up to a level about 145 percent of the prewar average by 1950–55. If depression conditions are experienced and farm incomes are low, the forces tending toward increased output would be considerably weakened, but even so, some progress in improved practices would be made. It seems safe to assume that the level of output for sale and for home use would be about 135 percent of the prewar average, even under depression conditions.

Once the level of production has been increased it tends to remain high. In other words, although farm production is responsive to increased prices and income and to improved practices on the upward side, it is quite unresponsive to depression conditions on the downward side. This type of production response results from the nature of farming costs, and from the organization of the farming industry into family farms with their high proportion of fixed to variable costs. Once investments for capital improvements have been made in farming they constitute fixed resources that will be used almost regardless of changes in the price of the product. For example, the tractors and other farm machinery that are bought immediately after the war will be on hand to use for several years.

On the other hand, some improved practices, such as the use of commercial fertilizer, involve variable rather than fixed costs, and their use, as well as their influence on production, may vary with the price of the product. Therefore, the level of production in depression periods would tend to be lower than in prosperity to the extent that there are temporary decreases in the use of variable resources. However, this tendency might be entirely offset by farmers struggling to maximize net returns above their variable costs, as they did in the years 1930–33.[2]

Some writers believe that the postwar production level is likely to be considerably lower than these estimates indicate. Norton and Sauer suggest a level about the average of 1938–40, which would be 106 percent of 1935–39.[3] Their reasons for expecting lower than the wartime level of production are: (1) a large part of

[2] See Farm Management Problems in an Era of Change, 1940 Yearbook of Agriculture, pp. 492–495.

[3] "Will Wartime Agricultural Production Be Maintained?" Illinois Farm Economics, Nos. 114 and 115, November and December 1944.

the wartime increase was in livestock "of a purely cyclical character"; (2) the increases reflect a conjunction of favorable years, use of accumulated feeds, and reserves of power and labor; and (3) the increases have involved greater expansion in soil depleting crops than can be sustained over a period of years.

In terms of animal units of all livestock on farms (including horses and mules) the average number for the years 1940–44 is not quite as large as the average for the years 1915–19; and the increase from the previous 5-year period is only slightly larger for 1940–44 than for 1915–19. However, more feed was required for the livestock on farms in World War II because of significant increases in production per animal, especially of milk and eggs.

The years 1935–39 were a period of slow recovery from the liquidation of the drought years 1934 and 1936. The total number of animal units on farms was lower in 1935–39 than for any consecutive five-year period since 1910. Unless another severe drought is experienced, a postwar return to the extremely low levels of 1935–39 therefore seems quite unlikely.

The important change in the livestock picture since the last war is the drop in horse and mule numbers. With 15 million animal units fewer horses and mules than in 1919 there is feed for that many more units of livestock for the market. The recent drop in hog and poultry numbers will result in large carry-overs of feed that, with average weather, will constitute an incentive for later increase in livestock numbers. Postwar livestock production is most likely to be maintained at considerably higher levels than the immediate prewar years.

The other two reasons given for not expecting maintenance of wartime production levels have already been touched upon, but the effect of reserves of power and labor on postwar production levels deserves further consideration. With the mechanization we now have, and the increase that seems likely during the first two or three years after the war, nearly all farmers will have some unutilized capacity in terms of family labor, power, and machinery. This will result in pressure to increase the size of the business—sometimes by adding more acres to the farm—but if that is not possible, by producing more labor-intensive crops and livestock, by using more lime and fertilizer, and by adopting other improved practices that result in increased output per acre and per animal.

Another viewpoint on the level of postwar production runs in

terms of attributing most of the wartime increase to favorable weather and to extra efforts in production, which will subside when the war is over. Little hope is held out for increasing production per acre over a period of years. The conclusion drawn from this argument is that we shall need to add about 4 million acres of new cropland per year to maintain a constant ratio of 4 acres of cropland per capita of the United States population.[4]

After careful analysis of crop yields and weather conditions over a period of years Shepard concludes that: "In allowing for variations in the weather of past years it becomes apparent that during the last 20 years crop yields per acre have been rising at the rate of nearly one percent per year. Excluding the particularly rapid increases in yields of fruits and cotton, yields are now about 13 percent higher than they were in comparable seasons 20 years ago."[5]

Farm output for sale and for home use per capita of the total United States population (including members of the Armed Forces) was 24 percent higher in 1944 than in 1935–39. It was 11 percent higher per capita than the previous peak years, 1910–14, when we harvested a third more land per capita than in 1944. If allowance is made for better than average weather in 1944, production was still 5 per cent higher per capita of population than in 1910–14.

The point is that we have shifted from producing power on the farm to producing products for the market; and we have substituted other resources for land—commercial fertilizer, for instance. One example of the results of substituting other resoucres for land is a 1944 cotton crop 84 percent as large as in 1928–32 on less than half the acreage grown at that time. It seems doubtful that we need to worry about not having enough land to feed and clothe a larger population as long as we can achieve such large increases in production as we have experienced in the war period, without any significant increase in our land base, and with nearly a 15 percent decrease in the effective labor force.[6]

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[4] "Why Irrigate More Land?" Address by Dr. John Lee Coulter at Thirteenth Annual Meeting of the National Reclamation Association, Denver, Colorado, November 16, 1944.

[5] "Prospective Crop Yields in 1945," The Agricultural Situation, February 1945.

[6] The writer believes that the case for some increase in irrigated land in the Western States rests on different grounds than the need for more land to increase food production. See "Irrigation Policies and Programs in the Northern Great Plains Region," THIS JOURNAL, Vol. XVIII, No. 3, August 1936.

Improved Practices Mean Lower Costs as Well as Increased Volume

It is apparent from the foregoing discussion that adoption of improved farming practices often results in increased production, especially of the volume of output that goes to market. When improvements result in increased marketable output they also are likely to cause lower farm prices unless demand for the product increases in proportion to the increase in production. In the first stage of adoption however, the farmers who have introduced certain improved practices retain all the benefits of lower costs and increased volume until, or unless, the increased output actually has resulted in lower prices. But after the price reduction has taken place, a part or all of the benefit may have been shifted to other groups. If the demand for the product is extremely inelastic it is possible that even more than the entire reduction in unit costs will be shifted to other groups in the form of lower prices.

Perhaps a more common longer time effect is that some of the marginal producers, who cannot adopt the improvement, shift into other lines of production; and those who remain in the field retain a part of the benefit of lower unit costs. The increased volume of output on farms adopting the improvement often makes it possible for them to retain a larger share of the gain. For example, a 20 percent decrease in cost per unit of a product may result in only a 10 percent increase in the total output that goes to market, and in less than a 20 per cent decrease in the price of the product to the farmer. He therefore retains a part of the benefit of the decreased cost per unit, which multiplied into perhaps a 15 percent larger output on his farm makes it possible to retain a considerable part of the benefit of the improvement.

Even if all of the decrease in unit costs were passed on to other groups in lower prices, the gain from the increased volume would be retained. An improvement that makes possible more output per acre and per animal usually results in large decreases in *cash operating expenses per unit* because the additional product can be handled without much additional labor and equipment. For example, on typical cash grain farms in the Corn Belt the volume of output increased about 30 percent from 1935–39 to 1940–43; and operating expenses *per unit* of *output* decreased about 10 percent,

despite an increase of nearly 18 percent in the index of prices paid by farmers for commodities used in production.

Farmers who have an opportunity to increase the size of the farm in acres as mechanized, labor saving practices are adopted are in a position to reap much larger benefits from improved practices. The net income available to the farm operator can be increased in this way, even though all of the benefit both from lower unit costs and increased product per acre is passed on to other groups in lower prices. This change, of course, increases management responsibility and also has some other effects that are discussed in the next section.

Not all improvements result in increased output. For example, a more efficient method of harvesting hay may only save labor in haying without resulting in the production of more hay. If improvements which do not have a tendency to increase output are adopted the price of the product will not be affected by their adoption. Therefore, the entire gain from such an improvement is likely to be held by farmers who adopt the practice. If some producers cannot adopt it, they will operate at a disadvantage in comparison with those who can benefit by adoption; but the actual level of their incomes will not be affected.

Since most improvements have a tendency to increase output, but some tend to lower costs without any significant effect on output, it is desirable to analyze their effects somewhat further by determining what improvements are *land saving*, *labor saving*, or *capital saving* in their effects. The improvements that are land saving in their effects have the greatest tendency to increase output. Those which are only labor saving or capital saving in their effects increase output only indirectly, if at all.

An improvement can be said to be land saving when its adoption results in increased output per acre or per animal. For example, the use of commercial fertilizer in many areas results in a large increase in physical production, and in value of output over cost of the fertilizer. Use of lime, winter cover crops, and improved crop varieties have similar effects. Adoption of tractor power releases land formerly used for producing feed for work stock, and is therefore land saving in its effect, but in a somewhat different sense.

The improvements mentioned as being land saving in their effects also tend to be labor saving in the sense that less labor is required per unit of product as more is produced per acre or per ani-

mal. Some improvements, however, are labor saving without also having the land saving effect that results from increasing output per acre or per animal. Among these can be mentioned all of the improved farm machinery, such as the combine harvester, corn picker, haying machinery, etc. All of the work simplification ideas that are now being developed come in this category.

But since these improvements are labor saving they do release time that can be spent on other enterprises, and this might indirectly result in increased output. On family farms this may mean pressure to increase the size of the farm in acres, or to build up the more labor intensive enterprises. Of course, if the labor released was hired by the day or on a piece-rate basis, the effect might be only to hire less labor. Even in that case a labor-saving improvement reduces the cost of the product to which it applies, and, therefore, makes its production relatively more profitable. In some instances this might result in shifting more resources to that enterprise; but the net result would not be a larger total product, unless the enterprise shifted into was more intensive than the one which was displaced.

If new land is available, that of course constitutes another way of increasing production of a product to which a labor-saving improvement applies. The plowing up of the Great Plains in the 1920's was largely the result of improved tractor power and adoption of the prairie-type combine harvester. But increasing production by the new land route is likely to be less important in the future.

Improvements are capital saving in their effects when they actually result in less use of capital for a given volume of production. For example, if a new type of combine harvester can be bought at a lower first cost than the machine it replaces, and it also requires a smaller outlay for operating expenses, it would be capital saving —both in its first investment and in capital outlay for current operation. Although most of the improvements in farming have had a tendency to require both a larger capital investment and larger current capital outlays on family farms, this tendency has not necessarily meant more capital for the same operation. Usually it has meant less capital per unit of product, providing the new machine or technique could be adopted on a scale that constituted a good fit in the existing organization. Quite frequently, however, the purchase of a tractor and tractor equipment has resulted in a high overhead investment in machinery for the existing size of

farm, and also in only partially utilized machinery and labor resources. This effect in turn results in pressure to increase the size of business—either in acres or by shifting to more intensive enterprises. If a larger business can be developed, and if the operator is capable of handling that larger business successfully, the result, as already mentioned, is an additional gain to the operator from the improvement. This raises the question of impacts of improvements on management.

Improved Practices Are Management Consuming

Although machines and other improvements are *land saving, capital saving,* or *labor saving* in their effects, most of them also are *management consuming* in the sense that more management effort is required to operate a farm business successfully. Mention already has been made of the fact that often adoption of improved practices makes it possible for a farm family to operate a larger farm, but the larger unit requires more management than a smaller one if the operation is to be successful. This, of course, does not necessarily mean more management per unit of product, but it does mean that more is required per farm; and also that it takes a higher grade of managerial ability for successful operation of the size of farm that can be handled by a farm family from a labor standpoint. Improvements also require that farmers learn new skills, such as tractor operation. Once learned, they may be no more difficult to carry out than the old practices, but farmers who adopt a new practice or a new machine must be willing to learn the new and discard the old; and this requires an alert and open mind.

The farmer who possesses managerial ability of a higher order will be able to combine the use of improved practices in a larger business to obtain a much higher net income for himself and his family, and therefore to benefit considerably by adoption of improvements. For example, preliminary studies indicate that increasing the size of a Great Plains wheat farm to the acreage that a farm family can readily handle with prevailing sizes of tractor equipment results in about a 20 percent decrease in cost per bushel, even after making allowance for the larger land investment. Since the larger farm would have about 75 percent more wheat to sell the net income available to the farm family would be more than doubled.

On the other hand, the farmer who possesses only limited mana-

gerial ability may have to continue operating a smaller farm on which he cannot take full advantage of the new improvements. This means that the disparity in incomes between farmers of A and C grade managerial ability will be widened by the technological change.

The management consuming effect of improvements can be seen more clearly in historical perspective if we compare the relatively self-sufficing pioneer farming with present day tractor farming in the Corn Belt. The same contrast can be seen in geographic perspective by comparing the self-sufficing farms of the Southern Appalachians, or the cut-over areas of the Lake States, with our mechanized Corn Belt farms. The successful Corn Belt farmer must first of all decide on the right combination of the relatively complex resources used in production, and then on the improved practices necessary to obtain optimum results. For example, he will not get maximum benefit from the use of commercial fertilizer unless he uses hybrid seed, plants on time, and controls weed growth, etc. Using improved practices *in the right combination to constitute a best fit, and carrying through with such a combination* is what requires a higher order of management than on farms in the handicraft stage.

Use of such improved practices as tractor power, lime and commercial fertilizer requires a larger capital investment and also larger current operating expenses. This means that farmers become more vulnerable to losses from crop failure and from low prices. The added risks give increased importance to crop and income insurance as a means of providing stability of farm income.

Since improvements result in lower costs which usually are shared with other groups in the form of lower prices, it appears to be nationally desirable to provide crop and income insurance designed to reduce vulnerability to crop and livestock losses and lower prices. For example, tractor power and associated equipment, along with improvements in wheat varieties and in cultural practices, have made wheat production possible in the high risk areas of the Great Plains region. Most of these areas can be profitably farmed over a period of years if some means are provided for tiding over years of drought, and of low prices that result from economic depression. Crop insurance on wheat is part of the answer, but it does not deal with the losses incurred from reduced prices because of maintaining a high level of cash expenses in order to continue in

production. There are two ways of dealing with that problem. One would be to establish price floors that would give wheat prices greater stability, and the other to provide for supplementary payments in years of low prices.

Perhaps some program analogous to unemployment insurance could be developed whereby farmers would pay into an income stabilization fund in favorable years and draw on this fund in unfavorable years. A development of this kind might combine crop insurance and income insurance into one program.[7]

Government aid can stimulate adoption of agricultural improvements in many ways. It can also cushion the shock to those who are adversely affected by technological advances. Farm operators and hired labor no longer needed in agriculture because of adoption of labor saving practices need assistance in finding other employment. Under conditions of high employment some aid can be provided by establishing local employment and training offices in rural areas. Farmers who cannot adopt a given improved practice may need credit and management guidance in shifting to other enterprises.

Sometimes new practices can be readily carried out by farmers providing technical aid is available for the first introduction of the new technique; for example, laying out the lines for contour farming. The possibilities of rendering service to farmers in the national interest by giving assistance in adoption of improved practices appear to be so great that it would justify provision for a considerable amount of technical aid to farmers in farm planning. More detailed assistance on farm management problems in the adoption of improved practices can be provided by farmers themselves through the organization of cooperative management associations, but such associations need public stimulation and assistance in getting started.[8]

In some areas there will be many farmers who will need credit and other assistance in obtaining additional land in order to operate on an economic basis with mechanical power and other improved practices. Existing agencies can provide the credit needed, but credit for the new system of farming needs to be combined with

[7] The recent report of the Committee on Postwar Agricultural Policy of the Association of Land-Grant Colleges and Universities, October 1944 (page 28), mentions the possibility of a program similar to this suggestion.

[8] See article entitled "For Farm Consultants," in Land Policy Review, Volume 4, No. 8, August 1941.

intelligent participation in management in order to work out and carry through long term farm plans that will maximize utilization of the resources available to the farm family.

Rapid improvements tend to make agriculture more dynamic. Therefore, a higher order of managerial ability is required to prevision future developments. Although the more capable operators probably can benefit from rapidly changing conditions, the rank and file of farmers are likely to be in greater need of education and other assistance in adjusting to new situations. Nevertheless, net returns to farmers often can be increased more effectively by helping them to produce at lower costs than by attempting to maintain higher prices. And the result is more beneficial to society as a whole, providing other employment alternatives are available for those who are no longer needed in farming.

Some Shifts in Production Will Be Necessary After the War

If domestic industry and foreign trade is maintained at high levels after the war, farm production also can continue at or above wartime levels, with satisfactory incomes to farmers. But even under those conditions some changes would be required in certain lines. The changes, however, would consist largely of shifts to other enterprises, and of improvements in farm practices.

In the recent State and Federal cooperative study of Production Adjustments After the War, assuming conditions of agricultural prosperity, an attempt was made to estimate the changes in level and pattern of production, and in farm practices, that would maintain or improve the farm plant and be profitable to farmers over a period of years. Preliminary tabulations of this material show some interesting results. Although changes are suggested in specific enterprises, the total cropland and livestock numbers are about at 1944 wartime levels. However, the increases in crop yields and production per animal that are suggested would result in a level of production considerably higher than in 1944.

The suggested cotton acreage of 23 million acres is only 14 percent above the low level of 1944, but it is estimated that it would be profitable to maintain the average yield per acre at slightly over 300 pounds. That is only a continuation of the rapid increase in cotton yields in recent years. In the Delta area, for example, yields of lint cotton per acre increased about 80 percent from the 5-year

average 1928–32 to the 3-year average 1941–43. This resulted in more than a 20 percent increase in total production, despite a 32 percent decrease in acreage during the same period. If an average yield of 300 pounds of lint per acre actually should be achieved on the suggested cotton acreage, important questions would arise concerning potential market outlets, including questions of foreign trade and competition with other fibers in the domestic market.

The future holds not only the prospect of increased yield per acre, but also the promise of successful cotton harvesting machinery. The cotton stripper appears to be ready for large scale adoption in the Great Plains cotton areas. Adoption of the mechanical picker may come somewhat more slowly, but it also is quite definitely on the horizon. A 2-row mechanical cotton stripper, operating on farms where other operations have been mechanized in the Great Plains cotton areas, makes it possible to produce cotton with tractor equipment using only a little over 6 hours of labor per acre, or 15 hours per bale of cotton. If the 1-row mechanical cotton picker can be used successfully in the Mississippi Delta, along with other tractor equipment, cotton can be produced in that area with an average of 46 hours of labor per acre, or 52 hours per bale of cotton. This compares with average labor requirements of 141 hours per acre, or 160 hours per bale of cotton, with 1-row mule equipment and share cropper operations.[9] What effect will such a revolution in cotton production eventually have on sizes of farms and on the amount of labor that can be effectively employed on cotton farms? And what about shifts in competitive advantage of different cotton producing areas?

The postwar wheat acreage suggested under prosperity conditions is 62.7 million seeded acres. At the yields per acre estimated for average weather conditions this acreage would result in a wheat crop of over 900 million bushels. Obviously this would be more wheat than would be needed for domestic food consumption. Questions immediately arise concerning the desirability of continuing production of wheat for feed as well as for food—even at feed prices; also questions as to the probable size of our export market.

Wheat production in the principal wheat areas is now mechanized to a greater extent than almost any other farm enterprise. However,

[9] See pages 24 and 25 of Bureau of Agricultural Economics processed report entitled "Changes in Cotton Production in War and Peace," by E. L. Langsford. The Delta labor requirements will be even lower than those indicated if the flame cultivator can be adapted for use on cotton.

many farms in the specialized wheat areas have not been enlarged to take full advantage of economical operation with mechanized equipment. As already indicated, the modal size of the family wheat farm would need to be doubled in many areas in order to obtain a good fit with present mechanical power and equipment, and available family labor. In some areas the question of developing livestock enterprises as side lines to wheat production needs to be seriously considered. In still other areas the risk of crop failure may be so high that efforts should be made to restore the land to grass cover, and shift to ranching operations. But this involves much less intensive use of land and therefore much larger units; also a whole chain of adjustments in local institutions.

Rather sharp postwar decreases are suggested in all three of the important oil crops—soybeans, peanuts and flaxseed. The outlook for the oil crops is intertwined with the kind of trade relations that are developed with other nations, and the restoration of oil enterprises in the tropics. However, it is important to remember that the oilseed meals constitute most of our high protein livestock feed. The present value of soybean meal is somewhat higher than the value of the oil from a bushel of soybeans. Consequently, the meal may be regarded as the main product rather than the by-product. Perhaps soybeans fit into farming systems in the more level areas of the Corn Belt sufficiently well to retain a fairly large soybean enterprise—one that will have competitive advantage in production because of its place in the rotation, and because it can be produced in the midst of an important oilseed meal consuming area.

A much larger acreage of the peanuts grown in the South will be hogged off after the war than was true in the prewar period. We may also retain a larger peanut enterprise to supply the edible trade.

Among the feed crops a 10 percent decrease in corn acreage was suggested, with some offsetting increases in oats and barley, and maintenance of the grain sorghum acreage. Tame hay would be increased considerably to provide forage for a high level of roughage consuming livestock. This change also is consistent with the basic principle of maintaining soil resources.

It is suggested that, with prosperity conditions, meat animals as a group should be maintained at somewhat higher levels than represented by 1944 production. The number of cattle and calves on farms and ranches would be slightly larger than the high level of 1944. In this connection it should be recalled that the decrease

in horse and mule numbers since 1919 has made room for 15 million additional animal units of productive livestock, without increasing the total feed supply. A high level of consumer purchasing power would be needed, along with some export markets for a part of the pork production, to find a profitable market outlet for such a high level of meat animal production. However, wartime experience demonstrates how demand for meat increases when the national income is high, and widely distributed.

The suggested milk production is nearly one-fourth above the 1944 level. This increase would be achieved by maintaining 9 percent more milk cows, and also by significantly increasing production per cow. This quantity of milk is about what would be needed to provide adequately for all of our domestic consumers at the level which nutritionists estimate would be desirable in a "high level prosperity diet."[10] Here is a challenge for those concerned with consumer education; also for those in a position to facilitate the marketing of dairy products. It is recognized, of course, that high level, widely distributed purchasing power is needed in order to increase milk consumption substantially; also that other means of distribution are needed for low-income people even under those conditions; and for special groups, such as for children in school lunches. But granting these conditions, how rapidly could we move in the direction of a nutritionally desirable level of milk consumption?

Can we utilize the new developments in the manufacture of whole milk and non-fat milk powders, ice cream mixes, and new techniques in cheese making to increase considerably the total outlet for dairy products? It should be possible with the right kind of nutrition education, and with a courageous price, marketing and distribution policy to close most of the gap between the present level of milk consumption, and a level that is nutritionally desirable. By and large the adjustments indicated as profitable to farmers under prosperity conditions in the postwar period also would achieve the twin objectives of high-level nutrition and conservation of soil resources. There would be relatively less emphasis on intertilled crops and on cash crops, and more on dairy and other roughage-consuming livestock; which means more close-growing crops

[10] See "Production Adjustments—1945 and Post-War," address by the writer at 22nd Annual Outlook Conference, Washington, November 14, 1944. Mimeographed by the Bureau of Agricultural Economics.

and hay and pasture. Adjustments in this direction also tend to minimize the pressure of production increases on market outlets.

Trial Balance of Potential Production and Prospective Market Outlets Is Needed

It should be distinctly understood that the level and pattern of production discussed in the preceding section was developed by estimating the amount of each product in relation to other products that it would be profitable for farmers to produce under prosperity conditions. The estimates, therefore, constitute a part of a trial balance that needs to be compared with prospective market outlets under comparable conditions before a desirable basis for postwar production can be developed. Although an analysis of potential market outlets is outside the scope of this paper, the following observations are ventured.

If domestic industry and foreign trade can be maintained at high levels in the postwar years, the total volume of production estimated as a profitable level under prosperity conditions probably could be disposed of at satisfactory incomes to most groups of producers. The indicated profitable response in some lines, especially cotton and wheat, call for further analysis and balancing with market outlets. But under conditions of national prosperity this would involve largely shifts from one enterprise to another. Such adjustment problems are manageable, *provided other production alternatives are available.* Surplus production in one commodity can then be remedied by encouraging producers to make positive shifts to the production of other products. In areas where other alternatives are limited it may be possible to render assistance in reducing costs to meet the lower price situation that results from increased production, and to find nonfarm employment for farm people who cannot obtain adequate incomes in agriculture.

However, if the total volume of production of agricultural products is too large for the prospective market only two possible remedies are in sight. One is larger markets, and the other is shrinking the size of the farm plant. With ever increasing efficiency in farm production, shrinking the size of the farm plant effectively means reducing the number of workers employed in agriculture. That is possible only under conditions of prosperity, when other employment opportunities are available. If farmers have to face a postwar world of chronic depression, the food supply is certain to

press heavily on available markets, and any tendency to reduce production by using less of the variable production resources probably will be more than offset by a larger number of farm workers seeking employment in agriculture.

Since total farm output is likely to be maintained almost regardless of economic conditions, farmers cannot afford to price themselves out of potential markets. Farm products will need to be priced at levels that will increase market outlets both at home and abroad. Benefits from improved practices will have to be shared with other groups in the form of lower prices. But cost reductions and increased volume that come with improved efficiency are not adequate protection to farmers from chronic depression and shrinking markets for farm products. Other measures are needed to cope with depression conditions. Shifts in production would be called for more than ever under those conditions, but changes from one product to another cannot bring about recovery of farm incomes in depression years. Providing food enough for health to those with inadequate incomes would help a little. But farmers cannot be prosperous unless there is a large market for farm products, both at home and abroad. Means can be devised for cushioning the shocks from travelling over a short depression detour, but over a period of time farmers cannot travel the high road of prosperity unless the entire national economy stays on that road.

POSTWAR AGRICULTURAL CREDIT PROBLEMS AND SUGGESTED ADJUSTMENTS

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TWO assumptions must be made regarding postwar land ownership and agricultural tenure if any discussion of credit needs in that period will be most meaningful. They are: (1) Fee simple ownership of land will continue to be the predominant type of ownership, and (2) Owner-operation will continue to be the predominant pattern of tenure.

The assumption of continued fee simple ownership, as the predominant pattern, does not imply the same unrestricted freedom in the use of privately owned land which our forebears knew in the nineteenth and early twentieth centuries; it is recognized that various restraints upon the use of private land will persist which have developed since a conservation conscious nation became aware of the social value of wise land use. Indeed, such restraints will probably increase in number and scope. However, they need not, and probable will not, interfere with the basic right of a fee simple owner to transfer title to whomever and in whatever manner he chooses. Nor will such restraints on land use seriously affect the utilization of credit to implement the transfer of land ownership. On the other hand, they may necessitate modifications in the extension of credit for production. The second assumption—namely, that owner-operation will continue as the predominant pattern of tenure—implies neither increase nor decrease from present levels of tenancy. A minimum amount of tenancy is desirable and necessary as a step on the road to owner-operation.

In this paper separate treatment will be accorded a number of facets of the post-war agricultural credit problem. The discussion will be neither exhaustive nor definitive, but will serve chiefly to raise issues which should be resolved if future credit needs of agriculture are to be served soundly and efficiently.

Another Land Boom?

Ever since the war began, an almost unbelievable quantity of thought and discussion has been devoted to prevention of the "coming farm land boom." Much of this was premature. It induced conservatism among many lenders too early in the inflationary sequence. As year adds upon year with still no sign of the threatened

deflation, it becomes increasingly difficult for many lenders to maintain conservative lending policies. Keen competition for the dwindling farm loan business further aggravates this situation. The necessity for many individual lenders to maintain loan volume or drastically curtail their services will likely push additional lenders into the "inflationary" lending group.

Happily, total farm indebtedness in the United States has decreased markedly since the war began, contrariwise to the movement during World War I. How much longer this trend will continue is problematical. The return to rural areas of veterans and war workers who desire to farm will likely increase the number of farm transfers from owners who are at or past retirement age and who have accumulated sufficient savings during the war to give them added security in retirement. This group of buyers will need and use credit. As a result, total farm indebtedness, both real estate and operating, may be expected to rise for a period following the war's end. In spite of all efforts to the contrary, an increasing number of individuals will assume debt obligations beyond their long time debt-repayment capacity. This will be especially true if high prices persist for a period after the war, a not unlikely development. This will place a strain upon the solvency of rural areas and rural financial institutions, with the advent of more normal post-war cost-price relationships.

The effectiveness with which agricultural credit needs may be serviced after the war will be a function, in part, of the extent to which unwarranted debt commitments are avoided in the years just ahead. It will be in the immediate future that lenders, farm leaders, and agricultural educators should strive to minimize the creation of insoluble debt situations. Means of doing this have been adequately discussed elsewhere.[1] It will suffice here to direct attention to the timeliness of their application now and in the immediate future.

Definition of "Credit" is Needed

Since 1933 in particular there appears to have developed considerable difference of opinion as to what the term "agricultural credit" actually means. The broad expansion of federal and quasi-

[1] For example, see M. M. Regan and Fred A. Clarenbach, Emergency Control in the Farm Real Estate Market, this JOURNAL, Vol. 24, No. 4, Nov. 1942, pp. 866–882; Wm. G. Murray, Land Market Regulations, this JOURNAL, Vol. 25, No. 1, Feb. 1943, pp. 203–218; and C. H. Hammar, A Reaction to Land Value Control Proposals, this JOURNAL, Vol. 25, No. 4, Nov. 1943, pp. 822–834.

federal lending agencies into and beyond the periphery of "sound" agricultural lending, making loan advances under the nomenclature of credit, has substantially diluted the traditional meaning of the term. For example, when a loan is made to a farmer at a rate of interest insufficient to cover actual loan servicing cost, interest on the funds used in making it, and a reasonable margin for possible losses, that loan begins to take on the characteristics of a partial grant. In similar manner, when the credit of an individual is supported completely by a guarantee on the part of the Federal Government, as in the case of CCC loans, there is a substitution of the credit of the latter for that of the former. In neither case is it anticipated that the borrower will bear all the costs involved in extension of the "credit." Such operations would be impossible without the substantial and continuing underwriting by the Federal Treasury.

Considerable misunderstanding and not a little criticism have at times surrounded the so-called "sound" credit agencies of the Farm Credit Administration because of the "soft" credit extended by other governmental agencies. A non-discerning public fails to distinguish between the two classes of lenders, particularly when both profess to extend "credit." Likewise, the so-called "soft" credit agencies have frequently been criticized for "making bad loans" which it was never intended would be completely self-supporting or would even completely pay out. The public, and sometimes the lawmakers, did not understand that the primary purpose of such "loans" was something other than extension of credit in the traditional sense.

It would serve public understanding and legal definitiveness if the term "credit" were reserved for the loaning of money where the interest rate and other charges were sufficient to cover all costs, including a calculated risk of loss. Loans which patently cannot be self-supporting, even if the borrower should meet all his contractual obligations, should be designated differently. Included in such loans are rehabilitation and tenant-purchase loans of the FSA, seed and feed loans, and RACC loans. Non-recourse loans extended to farmers for the general purpose of market stabilization, such as CCC loans, probably should not be called "loans" in the first instance. Before wartime price advances, a large share of such loans were nothing more than outright sales to the government at the time the "loan" was made. This will probably be true again following the war.

How Promote Farm Ownership With Sound Credit?

A still unsolved but fundamental problem in agricultural credit is the development of a satisfactory substitute in the financing of farm ownership and operation for the stock share financing used in corporations. In other words, the problem is to bridge the gap between the 50 or 60 percent loan acceptable as security for a bond issue and the 10 or 20 percent of capital owned by the farm operator who desires to purchase his farm. Tenant-purchase loans of the Farm Security Administration are not the answer, as they patently are not self-supporting. Moreover, although they have apparently been effective in their limited way, they have been operative only during a period of generally rising real estate values and their long time efficacy is not known. In the long-term credit field the second mortgage is about the only device that has been offered to bridge this gap, but it has not proved satisfactory, particularly as a means of tapping the more stable and dependable fund sources of the central money markets.

FHA loans to home builders apparently have solved this problem in the urban residential mortgage field. Even though one may argue that the one-half percent insurance fee charged on FHA loans may be below the long time actuarial rate, the principle behind those loans is evidently sound. It provides a mechanism whereby home purchasers with limited capital, through payment of an insurance charge in addition to the interest cost, may enjoy the security of home ownership long before they have accumulated the traditional "fifty percent." Critical and detailed analysis should be made of the activity of the FHA in insuring mortgage loans to appraise that experience, in the light of conditions existing in the agricultural lending field, to the end that deserving farmers may have access to some mechanism which will permit them to borrow with substantially less than 50 percent equity. The need for such analysis exists despite the lack of strict comparability between the financing of the urban home, on one hand, and that of the rural home and business combined on the other hand.

The typical farm is refinanced every generation, sometimes oftener. Its fortunes rise and fall with the financial status of its individual owner. Under less favorable price relationships than those now current, large numbers of good farmers spend the best years of their lives trying to get on top of sufficient equity to "purchase a mortgage" on a farm. If they had been able to acquire title

to the farm earlier in life although with somewhat less equity, the added income which would have accrued to them as owner of the farm they operated would have facilitated the unencumbered ownership of their farm at an earlier age. Likewise, it may be argued that the deserving young farmer would benefit in many cases if he were able to finance his operating capital and equipment with substantially less equity than is now typically required.

The dangers and disadvantages of low-equity financing must not be ignored when espousing the position outlined above. A substantial equity in mortgaged property has often enabled a borrower to ride through temporary periods of financial distress when other borrowers with less equity were facing foreclosure. Likewise, the borrower with a sizeable margin of equity is frequently able to manage his business more effectively than can heavily indebted farmers because of the more flexible nature of his capital resources, particularly operating capital. The above advantages of high-equity financing can be at least partly maintained in low-equity financing of qualified young farmers through certain adjustments in terms of the typical loan contract. Flexible but realistic repayment schedules will assist large numbers of such borrowers through temporarily unfavorable seasons or years. Relatively lower amortization requirements in the early part of the loan, with option of additional payments as desired, will permit more rapid accumulation of operating capital with its resultant added flexibility of management. It might even be practical in some cases to amortize a loan over a period of say 20 years, but to set aside say one-half of the amortization payments for "insurance" so that payments could extend over 40 years if necessary without the loan becoming delinquent.

Before we can effectively embark upon a program of low-equity farm financing through some scheme of mortgage insurance, we need to know much more about how farmers do and should use their total capital, including credit. The whole proposition of the use of capital by farmers has never been very effectively explored. After all, the majority of capital used in agriculture is not borrowed; it comes largely from retained earnings either by present operators or former operators from whom it was acquired by inheritance or other family arrangements. In our present state of knowledge it would be difficult to set up an effective plan for farm mortgage insurance on an actuarial basis. We need better answers to such

questions as how capital is accumulated in agriculture. What factors cause its depletion? What is the trend in net capital accumulation in the agricultural industry? What is the relationship between capital accumulation and depletion and the tenure pattern? Under what conditions should farmers increase or decrease the amount of capital in their business? How do investment opportunities vary among regions and types of farms? What are the variations in equity requirements for prudent operations among regions and types of farms? We also need a more thorough understanding of the risks involved in all kinds of agricultural lending under various geographic and economic conditions. Research should be undertaken promptly which will attempt the systematic accumulation of such information.[2] It will then be possible to minimize the mistakes that must inevitably be made if and when farm mortgages insurance is undertaken on an extensive basis following the war. We should then know more about the effective use of reserves by both borrowers and lenders as a buffer against temporary difficulty. It will then be more nearly possible for both lenders and borrowers to participate in low-equity mortgage financing to their mutual advantage.

The establishment of a sound scheme for low-equity mortgages given by capable young farmers would strongly implement the power of credit to promote farm ownership. Although it has always been contended that a primary function of the Federal land banks was to extend credit for the purchase of farms by farm operators, the banks in practice have operated chiefly as a refinancing agency rather than as an initiating agency. Statuatory loan limits rendered them unable to meet the credit requirements of large numbers of new farm owner-operators. The operations of the land banks have turned around refinancing of mortgages for so long that the fundamental dynamic function of the banks has been largely lost. For much the same reason insurance companies were likewise unable to serve this group of borrowers. Either the potential farm purchaser had to continue as a tenant while he awaited the accumulation of the required equity, or he borrowed from an individual, often the seller, in order to acquire title. Borrowings of the latter kind frequently involved junior mortgages, short maturities, high

[2] The Financial Research Program of the National Bureau of Economic Research contemplates sponsorship of such a research program, in cooperation with the lending agencies, BAE, and agricultural colleges.

interest costs, and the like. To the extent experience and competent analysis indicate that low-equity farm financing may be insured as a calculated risk, it should be possible to pledge high percentage insured farm mortgages as collateral for bond issues. Credit could then be used on a self-supporting and self-liquidating basis to facilitate transfer of fee simple ownership to qualified operators at an earlier age than is now possible.

Needed Adjustments In Credit Terms

Much progress has been made in the last dozen years in the matter of adjusting the terms of agricultural loans to the peculiar requirements of the agricultural industry. For example, in the case of real estate mortgages, the term of the typical mortgage has been extended to 20 or 30 years; the principle of amortization is widely accepted and used; interest costs have been lowered, particularly in areas remote from financial centers; loan fees have been reduced substantially and in many cases eliminated entirely; and the use of pre-payment funds as a reserve against "rainy days" is finding wide acceptance. The most noteworthy improvement in the area of farm production credit has probably been the shift in emphasis from security to ability to repay as a basis for extension of credit. Along with this shift has come the budgeted loan, under the terms of which a borrower may have his money advanced to him as he needs it and may repay the loan as income becomes available. Interest is charged only during the time the money is actually in use. Substantial improvements in production credit available to farmers have been made during the past decade by both production credit associations and banks.

On the other hand, not every recent change in credit terms has been for the good. The growing proportion of agricultural credit held by non-resident lenders has inevitably resulted in a certain stereotyping of the pattern of loans available to the individual borrower. The local lender, personally acquainted with the individual needs of his borrower, is able within limits to adapt the terms of his loan to those individual needs. The non-resident institutional lender can do so only with difficulty. In the latter case there is a tendency for lending policies and terms formulated in the home office to be applied with considerable inflexibility at the field office level. Non-resident lenders should make themselves aware of the needs of farmers for individual adaptations in loan terms, in order

that they may better integrate their lending facilities and services with existing need. This calls for added research on the part of agricultural colleges, lending agencies, and other research bodies. The need is not so much to know *how* farmers are using credit, but rather how they *should* use credit in order most effectively to serve their farm operations and financial growth. Entirely too much recent research has been of the former variety. There appears to be no valid reason why non-resident lenders cannot differentiate their loans sufficiently at the local level to meet the individualized needs of the borrowers, if information can be assembled to indicate the different credit needs that should be served and if dependable and responsible local agencies can be developed.

The possibility of more extensive use of the variable payment plan needs further exploration. The plan admittedly has its limitations. Experience has demonstrated that borrowers like it better in years of small payment than in years of heavy payment. The lender obviously prefers a loan contract with definite terms. Yet one who is genuinely interested in the improvement of agricultural credit cannot summarily dismiss such a device as the variable payment plan simply because it has not worked too satisfactorily in its limited application to date. It should be studied carefully in order that its defects may be remedied and it may become the means of assisting borrowers through periods of temporary financial difficulty.

The whole question of credit costs needs study. This includes not only the geographically uniform interest rates of the governmental and cooperative lenders, but also the question of fees charged for different kinds of service on loans of varying magnitude. Most students are in agreement that the geographically uniform interest rates of governmental and cooperative lenders are not economically sound. However, it is a matter of political realism that they cannot be other than uniform. On the other hand, there is considerable opportunity to vary net loan costs through the charging of closing fees, service fees, appraisal fees, and the like. In the case of cooperative lenders, further opportunity for cost differentiation exists in the payment of dividends by those local units whose operating costs and required reserve accumulations are below total charges to borrowers. The opportunity for cost differentiation of this character is greatest in the case of short-term loans which turn over frequently. It would be helpful if a body of information were de-

veloped showing the total net cost, including risk of loss, involved in agricultural loans of various amounts, maturities, purposes, and in different regions. It would then be possible for lenders, both public and private, to graduate costs charged borrowers in such a manner as more nearly to place their total credit operations on a self-supporting and a self-liquidating basis. Analyses of the kind suggested here would necessarily include a study of lenders' costs, within the institutions themselves, as well as such items as acquisition cost, servicing cost, and risk of loss.

Credit for Part-Time Farmers

There is considerable evidence that many legitimate credit needs of part-time farmers living near industrial areas are not being met. This group of individuals, living and operating as they do in the intermediate zone between farmers and urban workers, have become numerous in important areas during the last 15 years. They will probably become still more numerous in the years immediately ahead. Their agricultural operations are typically of such a size that the land banks and insurance companies hesitate to accept them as an agricultural credit risk. Likewise, although they are technically eligible for FHA insured residential loans, makers of such loans are often hesitant to lend money on rural developments of this character about whose future value they are less certain than that of urban residences. Moreover, the urban worker who purchases a small agricultural tract in the country primarily for residential purposes frequently needs more credit than can be extended on security of the residence alone. At the present time the credit needs of part-time farmers are not adequately met by any Federal or cooperative lending agency. In some cases local bankers are making an effort to serve this area. However, their coverage is spotty. A small number of life insurance lenders are making preparations to solicit loans among part-time farmers, but they are necessarily proceeding cautiously.

Additional information needs to be developed regarding the financial characteristics of part-time farmers in different parts of the country. We need to know more about the opportunities in this development for economy in living, supplementation of urban income through the production of food for home consumption and for sale, the degree of stability needed in urban income to insure success of the part-time farming venture, and related items. When

such information becomes available, both local lenders and non-resident institutional lenders may be expected to adapt their operations in order better to serve the credit needs of this growing group of people.

Credit for Improvements

Credit facilities for the financing of land improvements need to be modified. This would include credit for such things as buildings, tiling, soil conservation, forest holdings, and the like. Under existing practices it is very difficult for institutional lenders wisely to extend credit for such purposes, as not enough is known concerning the productivity of improvements. It is frequently true that investment in certain types of land improvement may bring a considerably greater return on investment than the original investment in the land itself, and may, therefore, markedly increase the safety of an original loan on the farm. At present nearly all types of lenders are hesitant to re-open a mortgage and extend additional credit for such obviously desirable improvements as drainage, liming, new buildings, fencing, and the like. In many cases where a mortgage already exists on the farm, about the only way additional credit may be obtained for such improvements is through a complete refinancing of the mortgage. This is both costly and troublesome. An arrangement needs to be developed under which qualified borrowers may receive additional advances from the mortgagee, without rewriting the mortgage, for the purpose of making improvements which are clearly desirable.

It is possible that we may need to revise our whole concept regarding loans for improvement purposes, especially now that the United States is so markedly a capital surplus country as compared with its capital deficit position of a few decades ago. It may be desirable in the more stable agricultural regions of the country to have long-term loans at low interest rates with little or no amortization, in order to encourage the improvement of farm homes and the improvement of farms generally. Amortization payments could then go into the improvements themselves rather than into the reduction of principal. Such an arrangement would not be unlike the corporate practice of operating indefinitely on borrowed capital, so long as improvements so financed yielded a rate of return substantially in excess of interest cost. This type of financing for rural improvements, used wisely, should result in a higher standard of rural living.

Low-Income Farmers

The financing of low-income farmers has been one of the most complex problems in agricultural finance during the last dozen years. Its solution is still not apparent; nor will the problem be any less pressing in the postwar era. With something like 50 percent of all farmers producing only 10 percent of all commercial farm products in this country, it is evident that large numbers of farmers must perforce be so limited in their scope of operations that there is little hope for their having sufficient income to enjoy a generally satisfactory standard of living. Moreover, it will be difficult to divorce from the financing of low-income farmers the ever-present political and social pressure to do something for the less fortunate.

The Farm Security Administration has gained valuable experience with this problem and has accumulated a considerable body of data with respect to the opportunity for economic and financial rehabilitation of various classes of low-income farmers. However, it must be remembered that practically the entire experience of the FSA has been during a period of rising prices. Its long-time efficacy is not known. It appears, however, that even the FSA primarily served clients in the top of the lower third of farmers, and that there still remained before the war a large group of low-income farmers without any form of adequate credit service. It is likely that credit would not help to rehabilitate a large share of the farmers in the latter class.

We need to give increased attention to what low-income farm people in over-populated areas can do to improve their economic situation. It becomes increasingly obvious that the trend toward mechanization of agriculture will necessitate permanent displacement of large numbers of these people from rural areas. This is a problem that cannot be solved by extension of credit, even though liberally subsidized. Such an approach merely postpones the inevitable adjustment and prolongs the agony of those whom it presumes to help. We need searching analyses of farming opportunities and alternative opportunities in the low-income problem areas of the country in order that lenders will have a better basis for discriminating between the small farmer whose position can be improved with credit and the one whose situation is hopeless. Then all lending agencies, and particularly direct governmental agencies, must approach this problem realistically and courageously. They must recognize, even in the face of political pressure, that

easy credit extended to one whose economic problem as a farmer is insoluble is good neither for the individual nor for society.

Private Versus Governmental Credit Agencies

Although it would be futile to attempt to resolve the whole question of competition between private and governmental agricultural lending agencies, there is need for clarification of the basic issues involved and for clearer delineation of types of services offered. It is not the purpose of this discussion to cover the relationship of public to private lending agencies. That was excellently done in a recent article by Dr. M. R. Benedict.[3] It will suffice here to point out that neither government nor private enterprise is a goal in itself. Neither is inherently good or bad. They are merely two different ways of doing the same things. However, in a society committed as we are to a fundamental belief in the superiority of private enterprise as a way of doing things, it would be desirable to have either definitive legislative restrictions or administrative policies which would insure that the so-called "sound" public agricultural credit agencies would operate without the benefit of continuing Federal subsidy.

Granted that subsidy may be desirable to help intiate cooperative and quasi-cooperative credit institutions, action should be taken as soon as possible to effectuate its retirement. This frequently has not been done. Subsidy retirements in recent years have sometimes come only as the result of extreme pressure from private lenders and other taxpayer groups. Much of the criticism directed toward the public "sound" credit agencies in the past can be avoided in the future if they will formulate and announce a realistic program for retiring the free capital which the United States Treasury has deposited with them. Private lenders can have no quarrel with competition from farmer owned cooperative agencies so long as the latter meet their own costs on a competitive basis.

Credit As An Instrument of Social Policy

We have come a long way from the traditional concept of the function of agricultural credit in our economy of free enterprise. In nearly every case the creditor formerly was interested primarily

[3] Benedict, M. R., The Relationship of Public to Private Lending Agencies (in Agriculture) and Recent Trends in Their Development. This JOURNAL, Vol. 27, No. 1, February 1945, pp. 88–103.

in whether the loan was good, the collateral adequate, the repayment possibility satisfactory. The borrower was concerned principally with the terms of the loan, fairness of the creditor, and the facility with which he could repay the loan. Neither creditor nor borrower was concerned much with the broad social effects which might flow out of the loan. In recent years a new emphasis has been placed on the function of agricultural credit. Many people now regard it as an instrument for furthering what they believe to be social progress. Credit becomes the vehicle for altering land use patterns, for solving tenure problems, for redistributing wealth, for influencing agricultural settlement, for controling land speculation and the like.

It is probably desirable that the use of agricultural credit be tied in with national agricultural policy, whatever that may be. If it is wise to promulgate national agricultural programs, then it is the part of consistency to integrate the various activities of the government affecting agriculture toward the accomplishment of those programs. This is particularly true of agricultural lending by those credit agencies which are substantially subsidized. The chief justification for continuing subsidy of this character must be the attainment of ends which are deemed to be either socially or economically desirable. It should be recognized however, that there are dangers inherent in the utilization of agricultural credit as an instrument of social policy. Sound credit extended on a self-liquidating basis should not be so used. To do so would strike at the foundation of the fee simple title, the unrestricted right to buy and sell land, and the right to bequeath it without hindrance. There should be formulated a clear statement of policy covering the extent to which the various public agricultural lending agencies expect consciously to use credit as a means of effecting social and economic change. This would call for a declaration of conditions which borrowers must meet and practices which they must follow in order to be eligible for the various types of credit available from public agencies.

Consolidation of Public Agencies

During the last Congress a select committee of the House Agricultural Committee, under the chairmanship of Harold Cooley of North Carolina, was constituted to study the FSA and other direct agricultural lending agencies of the government, and to make recommendations for needed legislation. This committee conducted

extensive hearings preliminary to the formulation of proposed legislation contained in a House Bill known as the "Farmers Home Corporation Act of 1944."[4] In mid-1944 the Cooley Committee was authorized to conduct a similar investigation of the agencies administered under the FCA. This investigation had only started when the Cooley Committee was terminated with the election of a new Congress. It is not clear at this writing whether either the entire House Agricultural Committee or a select sub-committee will proceed with the study and investigation of the Farm Credit Administration. That there is need for organic structural overhauling of the credit units within the FCA is generally agreed. Study is being given to this problem by responsible personnel within the FCA, as well as by isolated groups and individuals outside. However, such study is so intermittent and lacking in coordination that no comprehensive legislative proposal may be expected to result from it.

It would be helpful at the present time if a study commission were constituted, representative of various regions and interests throughout the country, to study the whole problem of government and agricultural finance. The primary function of the commission would be to make recommendations for a new legislative framework within which all public and quasi-public lending agencies would operate. Such a study commission would not be unlike that which President Wilson appointed in 1913, whose recommendations resulted in the Federal Farm Loan Act of 1916. Unless such an approach is taken to the simplification and streamlining of the public agricultural credit agencies, it is probable that we shall continue to patch up the old framework with amendment after amendment and new agency on top of new agency. What is needed in the years ahead is new organic legislation which will completely re-cast the structure and, to some degree, the functions of the public agricultural credit agencies.

It is possible for a farmer to go to a single bank in most sections of the Corn Belt, and, talking to a single individual across a single desk, obtain the following types of agricultural credit: four month production loan for financing seed and fertilizer; nine to twelve month production loan for financing cattle feeding; five year mortgage for financing a new barn or tiling system; and a twenty year

[4] This bill was originally introduced by Mr. Cooley as H. R. 4384 on March 13, 1944. After a turbulent course in public committee hearings, it was revised and reintroduced as H. R. 4876 on May 24, 1944. It was never adopted.

mortgage for purchase of a farm. In addition, the local farmers' business plant (cooperative) may borrow for operating capital or for new facilities from the same bank through the same individual. Under these circumstances, it is difficult for the average farmer to understand why he must contact anywhere from two to half a dozen different men in different offices to get comparable credit from a public or cooperative agency. Study should be given to the feasibility of having a single bank of discount and issue for agriculture that would be able to issue securities of various maturities and would be able to meet all the sound credit needs of agriculture. This would call for considerable consolidation of units and elimination of supervisory and regulatory bodies, from the national level clear through to the county level. It would mean one point of contact between farmer-borrowers and the lending institution. It would bring economies of operation. It would result in improved credit service for farmers.

Extension Education for Lenders

The extension departments of the various state agricultural colleges and state banking associations should develop cooperative extension educational programs in the granting and use of agricultural credit. Farmers should be taught when it is wise and unwise to use credit. They should be familiarized with practices which make the use of credit profitable. Agricultural lenders should be given opportunity to meet in regularly organized extension sessions to discuss the characteristics of agriculture and of agricultural lending with which they should be conversant, in order adequately to meet the credit needs of farmers in their trade areas. It would also be possible through such meetings for lenders to exchange with each other ideas that make for the development of better agricultural credit service. The agricultural colleges should get the concept that some of their most effective work for the improvement of agriculture in their states may be done through such an instrumentality as an extension educational program for lenders who daily contact and influence many farmers.

The Bank Examiner and Farm Loans

Although the Federal Reserve Act and subsequent legislation attempted to make special provision for longer maturity of agricultural loans through commercial banks, many commercial bankers have in fact experienced difficulty satisfying bank examiners

that their agricultural paper was liquid. In recent years there has been an evident shift, at the national level, in the attitude of such agencies as the FDIC and the Federal Reserve Board with respect to maturity dates of agricultural paper. It is now recognized that liquidity of agricultural paper is more a matter of repayment potentiality of the borrower than of the maturity date of the note. In the past many agricultural loans have been made by banks with the full understanding that the note would be renewed when it came due. In this way banks were able to finance farm operations which required more than six months for their completion. However, this method of finance is not satisfactory to a borrower. It is now recognized in important quarters that the twelve month or two year note of a farmer which has good repayment potentiality is more liquid than the six month note of the same farmer which obviously cannot be repaid at maturity because the operation being financed has not been completed. The problem ahead is to educate bank examiners and bankers to this new concept. When this is done our country banks will be better able to meet the credit needs of farmers on a sound basis.

Summary

The credit needs of agriculture after the war may be met most effectively if reasonable solutions are found for the problems listed herewith: 1, prevention of another land boom with its creation of unmanageable debt burdens; 2, completely separate standards for "sound" and "soft" credit; 3, the development of some mechanism which will permit qualified operators to borrow "sound" credit with less than 50 percent equity; 4, the attainment of desirable adjustments in credit terms; 5, the development of adequate credit facilities for part-time farmers; 6, improved credit for land betterments; 7, more searching study on the problem of low-income farmers; 8, the development of a broader basis for understanding of the relationship between private and public credit agencies; 9, the development of a statement of policy covering the use of credit as a means of effecting social and economic change; 10, the combining and streamlining of the public farm credit agencies; 11, the development of extension educational programs in agricultural lending for both borrowers and lenders; and 12, extension of the concept among bankers and bank examiners that liquidity of agricultural paper is more a function of repayment ability than of the maturity date on the note.

AGRICULTURAL MARKETING PROGRAMS AFTER THE WAR

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AT THE start I would like to state my personal conviction that the kind of agricultural marketing programs we had before the war will be inadequate in the postwar period. The marketing programs of the colleges and the various government agencies will not only have to be expanded and strengthened; they will need a considerable change of emphasis.

Before the war most of the work in agricultural marketing could be classified as research, education, service, or regulation. These efforts were designed primarily to make the existing marketing system operate as smoothly as possible. They did little to bring about fundamental changes in the marketing system,—nor even in methods of marketing. We will need more research, education, services and regulation after the war, but we will need much more than that. I believe that public agencies will, and should take greater responsibilities for determining the prices of farm products, for improving nutrition, for helping develop better physical facilities for processing and distribution, and for developing and promoting more efficient methods of marketing. I shall not attempt to give detailed reasons for this, but some of the reasons will be apparent in the following parts of the paper.

To carry out such a program we really need more than *Agricultural* Colleges or a Department of *Agriculture*. Perhaps we need a Department of *Food and Agriculture*, using the term "food" in the current broad sense—including tobacco, cotton, and so on. In any event, some appropriate public agencies must take real responsibility for improvements in the whole marketing system—all the way from the farmer to the city consumer. This includes meat distribution as well as livestock marketing. It includes terminal marketing problems and retailing as well as local problems of assembling and selling farm products.

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* This paper was written while the author was on leave from the War Food Administration. It represents the author's own personal views about the kinds of marketing programs that will be needed after the war. Neither the War Food Administration nor Iowa State College has any responsibility for these views.

Experience During the Depression and the War

Of course, this thought is not new. Even before the war public agencies were taking greater responsibilities for food marketing and distribution. During the war these responsibilities have greatly increased. Before the war, government agencies had developed and carried out several "action programs" in marketing. These resulted primarily from the industrial and agricultural depression. Low prices to farmers and huge surpluses brought insistent demands for government agencies to step in and do something about marketing. Among the results were price supporting purchases and loans, a government storage program, export subsidies, and marketing agreements. During the war, of course, it has been necessary to go much further in the management of our food supplies. Production goals represent one aspect of food management, but a great deal of the emphasis has necessarily been upon marketing and distribution—for example, price supports, price ceilings, procurement for lend-lease and military forces, food orders, priorities for transportation and storage, and so on.

Many of these controls can, and should, be abolished soon after the war. Yet, I believe public agencies will, and should, take a more active hand in food management after the war than they did before it. To make this clear I shall discuss first some of the most important food management jobs which will have to be tackled after the war. Then I shall touch very briefly upon the programs needed in the older fields of services and regulations.

Price Supports

Congress has directed that prices of most important farm products be supported for at least two or three years after the war ends. There is a perfectly sound reason for this. Farmers who stepped up production 30 percent to meet wartime needs should not be penalized by a demoralized market after the war. Almost everyone will agree that the farmer is entitled to some kind, and some degree, of protection after the war. The real question is, what kind of protection and how much.

The answer is not yet clear. The spirit of the Steagall Amendment might be carried out in many alternative ways, some of which would not particularly affect marketing. For example, if it is not possible to support unlimited production at 90 percent of parity,

we might attempt to reduce production, or we might pay a subsidy directly to the farmer. Neither of these alternatives would affect marketing very much. But neither of these alternatives seems entirely satisfactory. The government probably must stand ready to buy agricultural surpluses. But once the government buys surpluses it has a marketing program on its hands. What will the government do with the products it buys? There are many alternatives. The surpluses can be destroyed, or allowed to spoil; they can be stored; they can be dumped in foreign markets; they can be diverted to such uses as animal feed; they can be used in nutrition programs like school lunches; or they can be resold in the regular market at a loss. Once the government buys food surpluses it is in the food management business, and must have a marketing program to dispose of its goods. Its policies will affect not only the farmer, but also the food trades and the consumers.

This is not the proper place to analyze price policy. It may be in the farmer's long-term interest to introduce greater flexibility into the price support pattern. But, even if this is done, any price support operations will necessitate an active marketing program.

Nutrition Programs

In the 1930's, when markets would not absorb the food supplies, we began to realize that millions of consumers could not afford even a minimum diet from a nutritional standpoint. We have had serious surpluses in the market sense, but we have never had a general food surplus above the needs of the people in the United States and in the world. We must make a real attack on the problem of undernourishment. This means more research and education; but it also means developing an economic program which will enable undernourished people to obtain the food they need.

Before the war considerable progress was made on this front through such devices as school lunches, food stamps, milk stations, cotton mattresses, and distribution of food to institutions and to relief families. Most of these programs have been reduced or suspended during the war. The main exception is the School Lunch Program.

We will need not only to develop programs of this kind, but to put greater emphasis upon nutrition. Surplus disposal alone is not enough. School lunches should be extended after the war to more children—perhaps, even to all children, regardless of the income of

the parents. In addition, we will need some kind of program for families with low per capita income. One form of program that is now being discussed is a so-called, "food allotment program." A bill introduced by Senator Aiken last year would set up such a program. The purpose would be to enable low-income families to buy the "adequate diet at minimum cost." If all low-income families actually did get such a diet we would not only use up a lot of surplus food; we would be making real progress in nutrition and health.

Serious consideration is now being given to various forms of food allotment programs—especially to means of assuring that government subsidies are used, mainly at least, to bring about a net increase in food consumption. One way of doing this (not the way in the present Aiken Bill) would be to sell a complete book of coupons of a value equal to the cost of the entire diet. Participating families would be required to pay some percentage of their income —possibly 40 percent. For example, the diet would cost about $60 a month for a family of four persons. A family of four with a monthly income of $100 could buy $60 worth of food coupons for $40.

Marketing Agreements

The two preceding sections discuss programs which would be carried out primarily by government agencies. But much can be done by farmers, cooperative associations, processors and dealers. In fact, the most fundamental improvements in marketing will doubtless be made by these groups, rather than be imposed by government agencies.

For years the food trades, as well as marketing students, have realized that there is a great deal of expensive overlapping and duplication in the marketing system. City milk distribution is a classic example, but there are many other, less obvious, ones. Why don't we do something about it? The reasons are many and complex, but perhaps the main reason is that we have never had a satisfactory mechanism for bringing about active cooperation between the food trades and the government agencies. The food trades could make great improvements if the government could enforce a program agreed upon by most of the industry. The answer may well be some form of marketing agreement—but an agreement that goes far beyond the scope of the present agreements on milk

and vegetables. We will need some kind of agreement to deal with the inefficiencies and uneconomic practices in the markets.

Marketing Facilities

Great improvements are needed in processing facilities and in terminal market facilities for perishables such as fruits, vegetables and poultry. Our efforts in the past have been centered too much upon the problems close to the farmer, and we have done little to improve the central and terminal markets. Possibly this is another problem which could be solved through something like a marketing agreement. Food dealers want better facilities fully as much as do the farmer and the consumer. Some states (New York, for example) have set up market authorities to deal with this problem, and have made good progress. The big terminal markets deserve attention from both state and federal authorities. One problem here, of course, is money. A new terminal in New York City would be expensive. Yet, if it were properly planned and properly managed it would be entirely and truly self-liquidating, and would be of lasting benefit to agriculture and to the general public. Any public works program should give careful attention to the needs for better market facilities.

Services and Regulations

In spite of the emphasis upon food management programs we should remember the need for strengthening the older, and basic, programs of grades, standards, inspection, market news, and enforcement of various fair trade laws and regulations. These will continue to be important after the war, but most of these programs will need strengthening.

Perhaps we should make a few very brief comments concerning some of these activities. The grading and inspection program needs to be extended at both ends—to the farmer and to the consumer. Great progress has been made in the adoption of uniform grades as the basis for wholesale trading in central and terminal markets. This is a real accomplishment, but farmers and consumers would get even greater benefits if the program were more adapted to their needs. Market news will need a good deal of readjustment and expansion to cope with the trend toward decentralized marketing. We will need much more than quotations in a few big markets. We will need a general picture of the supply and price situation through-

out the country, and we will need to carry it both ways—to the farmer and to the consumer.

Fair trade laws are in an evolutionary state. We need a real policy for dealing with the large corporations now engaged in the food business. We should not penalize efficiency and reward inefficiency. Neither should we allow monopolistic practices that limit the market, that raise prices unnecessarily high to the consumer, nor that force farm prices below the economic level. This is an important matter of food marketing policy, and one which has not received enough attention by agricultural marketing experts.

A similar subject is that of interstate trade barriers. These are monopolistic programs carried out through various laws and regulations that interfere with trade. The evils of trade barriers are generally conceded. We need a program for eliminating these and for preventing new ones.

Research and Education

Real lasting progress can come only through research and education. We cannot wait very long before tackling some of the problems discussed above, but we must be doing the research needed to give the basis of a sound program. I believe there is a need for changing the emphasis of marketing research and education. In the past we have too often been content with gathering and teaching facts and statistics describing now things are marketed. Our efforts in this field have been concentrated too much on the farm end of the marketing system, and have given too little attention to the city distribution end. More of our future efforts should be devoted to analyzing the weaknesses of our marketing system and developing positive, and constructive, programs for improving it. Moreover, we cannot stop with writing bulletins. We must find a way of stimulating the thinking of farmers, dealers, and voters. It is not enough to write bulletins criticizing current programs, or even pointing out possible improvements in the programs. The issues must be understood by the people, and by their representatives in Congress and in the state legislatures. This is a job that must be done by the research men and teachers in the field of marketing.

THE COST OF SUBSISTENCE

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ELABORATE investigations have been made of the adequacy of diets at various income levels, and a considerable number of "low-cost," "moderate," and "expensive" diets have been recommended to consumers. Yet, so far as I know, no one has determined the minimum cost of obtaining the amounts of calories, protein, minerals, and vitamins which these studies accept as adequate or optimum. This will be done in the present paper, not only for its own interest but because it sheds much light on the meaning of conventional "low-cost" diets.

This paper is organized under five headings, devoted to

1. The quantities of the various nutrients which should be contained in an average person's diet.
2. The quantities of these nutrients which are found in certain common foods.
3. The methodology of finding the minimum cost diet.
4. The minimum cost diet in August 1939 and August 1944.
5. Comparison with conventional low-cost diets.

The curious may wish to turn first to Table 2, which gives the composition and cost of the most economical diets in August 1939 and 1944 for an active economist (weighing 70 kilograms) who lives in a large city.

Nutritive Requirements

The economist uses a production function to describe the relationship between the quantities of the productive services and the quantity of product. The product derived from an increment of productive service A is usually assumed (1) to diminish as the quantity of A increases, and (2) to depend upon the quantities of the other productive services used with A.

This approach can be applied also to the relationship between quantities of nutrients and "health" (used here generically to describe strength, vigor, avoidance of disease, etc.). The findings of nutrition studies clearly indicate:

1. After certain minimum values of the nutrients are secured, additional quantities yield decreasing (and in some cases eventually negative) returns to health.
2. The optimum quantity of any nutrient depends upon the quantities of the other nutrients available.

A few of the many illustrations of these findings may be given.

Diminishing returns is illustrated by the facts that the amount of calcium in the body increases much more slowly than the input of calcium, and that increases of longevity are not proportional to increases of calcium inputs.[1] The incidence of goiter was found to vary in inverse proportion to the amount of iodine in the water in Michigan localities.[2] An example of substitution is the recommendation of 30 micrograms of thiamine per 100 calories not derived from fats,[3] and one of complementarity is the loss of riboflavin which accompanies a deficiency of thiamine.[4]

The science of nutrition is much too young to have attained even an approximate measurement of the "health" function for representative individuals, or to determine the extent of individual variation. The optimum quantity of calories is known fairly accurately, but the requirements of other nutrients are known only roughly or not at all. Many minima (to which 50 percent is usually added as a safety factor) are found by determining the lowest level of input compatible with a stable rate of loss of the nutrient through excreta. It is probable that nutrient requirements have been overstated; for example, a 5 month experiment on young men with riboflavin held at less than two-thirds of the recommended level led to the conclusion that they did not suffer any clinical or physiological defects.[5] The interrelationships among the various nutrients are even more obscure, and they are virtually ignored in dietary recommendations.

The ultimate health function will doubtless be very complex. In addition to calories, the body requires about thirteen minerals (some in very minute quantities), and perhaps half as many vitamins. Protein contains two dozen amino acids, of which almost

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[1] Sherman, H. C., H. L. Campbell, and C. S. Lanford, "Experiments on the Relation of Nutrition to the Composition of the Body and the Length of Life," *Proceedings of the National Academy of Science*, XXV (1939), 16–20.

[2] Curtis, G. M. and M. B. Fertman, "Iodine in Nutrition," *Journal of the American Medical Association*, Vol. 121 (February 6, 1943), p. 423.

[3] Sherman, H. C., *Chemistry of Food and Nutrition* (6th ed., 1941), p. 360.

[4] Sure, B., "Vitamin Interrelationships, III," *Journal of Nutrition*, XXVII (1944), 447–52.

[5] The tests were made on conscientious objectors; see A. Keys, A. F. Henschel, O. Mickelsen, J. M. Brozek, and J. H. Crawford, "Physiological and Biochemical Functions in Normal Young Men on a Diet restricted in Riboflavin," *Journal of Nutrition*, XXVII (1944), 165–78. Similar results were found for thiamine when the daily output was .9 mg.; see A. Keys, A. F. Henschel, O. Mickelsen, and J. M. Brozek, "The Performance of Normal Young Men on Controlled Thiamine Intakes," *Journal of Nutrition*, XXVI (1943), 399–415.

half are necessary to human beings.[6] The precise determination of our needs for these—and no doubt other yet undiscovered—nutrients lies far in the future.

Nevertheless standards of dietary adequacy have been established, perhaps prematurely and certainly very tentatively. The "allowances" (a term used to indicate their preliminary nature) of the National Research Council embody what is presumably the 1943 consensus of the experts; they are given in Table 1. Other minerals and vitamins are believed to be supplied in adequate quantities if these nutrients are secured from natural foods. The requirements are net of losses in the preparation of food. These standards are met by the minimum cost diets derived subsequently.

TABLE 1. DAILY ALLOWANCES OF NUTRIENTS FOR A MODERATELY ACTIVE MAN (weighing 154 pounds)*

Nutrient	Allowance
Calories	3,000 calories
Protein	70 grams
Calcium	.8 grams
Iron	12 milligrams
Vitamin A	5,000 International Units
Thiamine (B_1)	1.8 milligrams
Riboflavin (B_2 or G)	2.7 milligrams
Niacin (Nicotinic Acid)	18 milligrams
Ascorbic Acid (C)	75 milligrams

* National Research Council, *Recommended Dietary Allowances*, Reprint and Circular Series No. 115, January, 1943.

Nutritive Values of Foods

The minimum cost of an adequate diet is obviously governed by the nutritive values and costs of the foods eligible for inclusion. The very restricted list of foods considered in this study is discussed in Section 3 and the foods are listed in Tables A and B. It may be mentioned here that only natural foods are included; vitamin pills are excluded because they do not contain all of the nutrients (known and unknown) which are necessary to good health.[7]

The nutritive values of common foods are known only roughly,

[6] For summaries of the present knowledge, see *Yearbook of Agriculture*, 1939, Food and Life; H. C. Sherman, *Chemistry of Food and Nutrition* (6th ed., 1941).

[7] Puppies put on a diet in which the vitamins were provided from synthetic sources lived only 100 to 150 days; see J. P. Lambooy and E. S. Nasset, "The Inadequacy of Eight Synthetic B Vitamins for the Nutrition of Puppies," *Journal of Nutrition*, XXVI (1943), 293–302.

1 3.6 1,260 4.4 141.1 .2 36.5

TABLE A. NUTRITIVE VALUES OF COMMON FOODS PER DOLLAR OF EXPENDITURE, AUGUST 15, 1939

Commodity	Unit	Price Aug. 15, 1939 (cents)	Edible Weight per $1.00 (grams)	Calories (1,000)	Protein (grams)	Calcium (grams)	Iron (mg.)	Vitamin A (1,000 I.U.)	Thiamine (mg.)	Riboflavin (mg.)	Niacin (mg.)	Ascorbic Acid (mg.)
**1. Wheat Flour (Enriched)	10 lb.	36.0	12,600	44.7	1,411	2.0	365		55.4	33.3	441	
2. Macaroni	1 lb.	14.1	3,217	11.6	418	.7	54		3.2	1.9	68	
3. Wheat Cereal (Enriched)	28 oz.	24.2	3,280	11.8	377	14.4	175		14.4	8.8	114	
4. Corn Flakes	8 oz.	7.1	3,194	11.4	252	.1	56		13.5	2.3	68	
5. Corn Meal	1 lb.	4.6	9,861	36.0	897	1.7	99	30.9	17.4	7.9	106	
6. Hominy Grits	24 oz.	8.5	8,005	28.6	680	.8	80		10.6	1.6	110	
7. Rice	1 lb.	7.5	6,048	21.2	460	.6	41		2.0	4.8	60	
8. Rolled Oats	1 lb.	7.1	6,389	25.3	907	5.1	341		37.1	8.9	64	
9. White Bread (Enriched)	1 lb.	7.9	5,742	15.0	488	2.5	115		13.8	8.5	126	
10. Whole Wheat Bread	1 lb.	9.1	4,985	12.2	484	2.7	125		13.9	6.4	160	
11. Rye Bread	1 lb.	9.2	4,930	12.4	439	1.1	82		9.9	3.0	66	
12. Pound Cake	1 lb.	24.8	1,829	8.0	130	.4	31	18.9	2.8	3.0	17	
13. Soda Crackers	1 lb.	15.1	3,004	12.5	288	.5	50					
14. Milk	1 qt.	11.0	8,867	6.1	310	10.5	18	16.8	4.0	16.0	7	177
**15. Evaporated Milk (can)	14½ oz.	6.7	6,035	8.4	422	15.1	9	26.0	3.0	23.5	11	60
16. Butter	1 lb.	30.8	1,473	10.8	9	.2	3	44.2		.2	2	
*17. Oleomargarine	1 lb.	16.1	2,817	20.6	17	.6	6	55.8	.2			
18. Eggs	1 doz.	32.6	1,857	2.9	238	1.0	52	18.6	2.8	6.5	1	
**19. Cheese (Cheddar)	1 lb.	24.2	1,874	7.4	448	16.4	19	28.1	.8	10.3	4	
20. Cream	½ pt.	14.1	1,689	3.5	49	1.7	3	16.9	.6	2.5		17
21. Peanut Butter	1 lb.	17.9	2,534	15.7	661	1.0	48		9.6	8.1	471	
22. Mayonnaise	½ pt.	16.7	1,198	8.6	18	.2	8	2.7	.4	.5		
23. Crisco	1 lb.	20.3	2,234	20.1								
24. Lard	1 lb.	9.8	4,628	41.7				.2		.5	5	
25. Sirloin Steak	1 lb.	39.6	1,145*	2.9	166	.1	34	.2	2.1	2.9	69	
26. Round Steak	1 lb.	36.4	1,246*	2.2	214	.1	32	.4	2.5	2.4	87	
27. Rib Roast	1 lb.	29.2	1,553*	3.4	213	.1	33			2.0		
28. Chuck Roast	1 lb.	22.6	2,007*	3.6	309	.2	46	.4	1.0	4.0	120	
29. Plate	1 lb.	14.6	3,107*	8.5	404	.2	62		.9			
**30. Liver (Beef)	1 lb.	26.8	1,692*	2.2	333	.2	139	169.2	6.4	50.8	316	525
31. Leg of Lamb	1 lb.	27.6	1,643*	3.1	245	.1	20		2.8	3.9	86	
32. Lamb Chops (Rib)	1 lb.	36.6	1,239*	3.3	140	.1	15		1.7	2.7	54	
33. Pork Chops	1 lb.	30.7	1,477*	3.5	196	.2	30		17.4	2.7	60	
34. Pork Loin Roast	1 lb.	24.2	1,874*	4.4	249	.3	37		18.2	3.6	79	
35. Bacon	1 lb.	25.6	1,772*	10.4	152	.2	23		1.8	1.8	71	
36. Ham—smoked	1 lb.	27.4	1,655*	6.7	212	.2	31		9.9	3.3	50	
37. Salt Pork	1 lb.	16.0	2,835*	18.8	164	.1	26		1.4	1.8		
38. Roasting Chicken	1 lb.	30.3	1,497*	1.8	184	.1	30	.1	.9	1.8	68	46
39. Veal Cutlets	1 lb.	42.3	1,072*	1.7	156	.1	24		1.4	2.4	57	
40. Salmon, Pink (can)	16 oz.	13.0	3,489	5.8	705	6.8	45	3.5	1.0	4.9	209	
41. Apples	1 lb.	4.4	9,072	5.8	27	.5	36	7.3	3.6	2.7	5	544
42. Bananas	1 lb.	6.1	4,982	4.9	60	.4	30	17.4	2.5	3.5	28	498
43. Lemons	1 doz.	26.0	2,380	1.0	21	.5	14		.5		4	952
44. Oranges	1 doz.	30.9	4,439	2.2	40	1.1	18	11.1	3.6	1.3	10	1,998
*45. Green Beans	1 lb.	7.1	5,750	2.4	138	3.7	80	69.0	4.3	5.8	37	862
**46. Cabbage	1 lb.	3.7	8,949	2.6	125	4.0	36	7.2	9.0	4.5	26	5,369
47. Carrots	1 bunch	4.7	6,080	2.7	73	2.8	43	188.5	6.1	4.3	89	608
48. Celery	1 stalk	7.3	3,915	.9	51	3.0	23	.9	1.4	1.4	9	313
49. Lettuce	1 head	8.2	2,247	.4	27	1.1	22	112.4	1.8	3.4	11	449
*50. Onions	1 lb.	3.6	11,844	5.8	166	3.8	59	16.6	4.7	5.9	21	1,184
*51. Potatoes	15 lb.	34.0	16,810	14.3	336	1.8	118	6.7	29.4	7.1	198	2,522
**52. Spinach	1 lb.	8.1	4,592	1.1	106	—	138	918.4	5.7	13.8	33	2,755
**53. Sweet Potatoes	1 lb.	5.1	7,649	9.6	138	2.7	54	290.7	8.4	5.4	83	1,912

48. Celery	1 stalk	7.3	5,910	.4	27	1.1	22	112.4	1.8	3.4	11	449
49. Lettuce	1 head	8.2	2,247	.4	27	1.1	22	112.4	1.8	3.4	11	449
*50. Onions	1 lb.	3.6	11,844	5.8	166	3.8	59	16.6	4.7	5.9	21	1,184
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**53. Sweet Potatoes	1 lb.	5.1	7,649	9.6	138	2.7	54	290.7	8.4	5.4	83	1,912
54. Peaches (can)	No. 2½	16.8	4,894	3.7	20	.4	10	21.5	.5	1.0	31	196
55. Pears (can)	No. 2½	20.4	4,030	3.0	8	.3	8	.8	.8	.8	5	81
56. Pineapple (can)	No. 2½	21.3	3,993	2.4	16	.4	8	2.0	2.8	.8	7	399
57. Asparagus (can)	No. 2	27.7	1,945	.4	33	.5	12	16.3	1.4	2.1	17	272
58. Green Beans (can)	No. 2	10.0	5,386	1.0	54	2.0	65	53.9	1.6	4.3	32	431
59. Pork and Beans (can)	16 oz.	7.1	6,389	7.5	364	4.0	134	3.5	8.3	7.7	56	
60. Corn (can)	No. 2	10.4	5,452	5.2	136	.2	16	12.0	1.6	2.7	42	218
61. Peas (can)	No. 2	13.8	4,109	2.3	136	.6	45	34.9	4.9	2.5	37	370
62. Tomatoes (can)	No. 2	8.6	6,263	1.3	63	.7	38	53.2	3.4	2.5	36	1,253
63. Tomato Soup (can)	10½ oz.	7.6	3,917	1.6	71	.6	43	57.9	3.5	2.4	67	862
*64. Peaches, Dried	1 lb.	15.7	2,889	8.5	87	1.7	173	86.8	1.2	4.3	55	57
*65. Prunes, Dried	1 lb.	9.0	4,284	12.8	99	2.5	154	85.7	3.9	4.3	65	257
66. Raisins, Dried	15 oz.	9.4	4,524	13.5	104	2.5	136	4.5	6.3	1.4	24	136
67. Peas, Dried	1 lb.	7.9	5,742	20.0	1,367	4.2	345	2.9	28.7	18.4	162	
**68. Lima Beans, Dried	1 lb.	8.9	5,097	17.4	1,055	3.7	459	5.1	26.9	38.2	93	
**69. Navy Beans, Dried	1 lb.	5.9	7,688	26.9	1,691	11.4	792		38.4	24.6	217	
70. Coffee	1 lb.	22.4	2,025	—	—	—	—		4.0	5.1	50	
71. Tea	¼ lb.	17.4	652	—	—	—	—			2.3	42	
72. Cocoa	8 oz.	8.6	2,637	8.7	287	3.0	72		2.0	11.9	40	
73. Chocolate	8 oz.	16.2	1,400	8.0	77	1.3	39		.9	3.4	14	
74. Sugar	10 lb.	51.7	8,773	34.9	—	—	—				5	
75. Corn Sirup	24 oz.	13.7	4,966	14.7	—	.5	74					
76. Molasses	18 oz.	13.6	3,752	9.0	—	10.3	244		1.9	7.5	146	
77. Strawberry Preserves	1 lb.	20.5	2,213	6.4	11	.4	7	.2	.2	.4	3	

* Quantities including inedible portions.

TABLE B. NUTRITIVE VALUES OF COMMON FOODS PER DOLLAR OF EXPENDITURE, AUGUST 15, 1944

Commodity	Price Aug. 15, 1944 (cents)	Calories (1,000)	Protein (grams)	Calcium (grams)	Iron (mg.)	Vitamin A (1,000 I.U.)	Thiamine (mg.)	Riboflavin (mg.)	Niacin (mg.)	Ascorbic Acid (mg.)
1. Wheat Flour	64.6	24.9	786	1.1	203		30.9	18.6	246	
3. Wheat Cereal	23.2	12.3	393	15.0	183		15.0	9.2	119	
5. Corn Meal	6.3	26.3	655	1.2	72	22.6	12.7	5.8	77	
8. Rolled Oats	9.9	18.1	651	3.7	245		26.6	6.4	46	
15. Evaporated Milk	10.0	5.6	283	10.1	6	17.4	2.0	15.7	7	40
46. Cabbage	4.9	2.0	94	3.0	27	5.4	6.8	3.4	20	4,054
51. Potatoes	80.1	6.1	143	.8	50	2.8	12.5	3.0	84	1,071
52. Spinach	11.6	.8	74	—	96	641.3	4.0	9.6	23	1,924
53. Sweet Potatoes	12.3	4.0	57	1.1	22	120.5	3.5	2.2	34	793
69. Navy Beans	10.8	14.7	924	6.2	433		21.0	13.4	119	
74. Sugar	67.0	26.9	—	—	—					
78. Pancake Flour[1]	12.2	16.0	479	18.1	46		3.7	1.9	41	
79. Beets[2]	7.3	2.2	85	1.1	70	132.3	2.9	6.3	29	895
80. Liver (Pork)[3]	21.9	2.7	408	.2	518	145.0	10.4	51.8	472	580

[1] Unit: 20 oz.; edible weight: 4,647 g. [2] Unit: 1 bunch; edible weight: 4,071 g. [3] Unit: 1 lb.; edible weight: 2,071 g.

and indeed they *can* be known only roughly. A large margin of uncertainty arises on several scores:

1. Many nutritive values have not been established quantitatively, or have been determined by obsolete and inaccurate techniques, or the determinations have large standard errors. Beef flank is known to contain the B complex, but the quantities are unknown. Vitamin A is measured by the rate of growth of rats, with standard errors averaging 10 or 15 percent of the mean values.
2. Most foods are not even approximately homogeneous, and wide ranges of nutritive values are found. For example, the milligrams of ascorbic acid in 100 grams of apples varies as follows with variety:[8]

Jonathan	4.4
McIntosh	2.0
Northern Spy	11.0
Ontario	20.8
Winesap	5.8
Winter Banana	6.6

   Again, the ascorbic acid in milk varies with the season.
3. The maturity of the product, the length and conditions of storage, temperature, and similar factors are important. The ascorbic acid decreases with the maturing of corn, but the vitamin A content increases. Vitamin A, thiamine, and ascorbic acid are often lost during storage.
4. Even when the nutritive values of the food are known, they are much affected by the way the food is prepared. Well-done rib roasts of beef have 69 percent of the thiamine, 77 percent of the riboflavin, and 79 percent of the niacin present in the raw cuts. Cabbage has a high ascorbic acid content, but if it is boiled for several hours and the liquid discarded, virtually none of the vitamin survives. On the other hand the vitamin A in turnip greens is increased by cooking.
5. The proportion of food wasted is an additional unknown in the evaluation of ordinary diets.[9]
6. The nutrients in foods cannot be wholly extracted. Spinach contains much calcium but it is not nutritionally available because of the presence of oxalic acid.

Enough difficulties have been indicated to suggest the almost infinite complexity of a refined and accurate assessment of nutritive value of a diet.

[8] On this and subsequent points, see L. E. Booher, E. R. Hartzler, and E. M. Hewston, *A Compilation of the Vitamin Values of Foods in Relation to Processing and Other Variants*, Department of Agriculture, Circular 638 (May 1942); and G. Adams and S. L. Smith, *The Vitamin Content and the Preservation of Foods*, Department of Agriculture, Miscell. Public. No. 536 (1944).

[9] Another difficulty that may be mentioned in this connection is the variation in the quantity of food received for a given price, as when oranges are purchased by the dozen and celery by the stalk.

In the subsequent work, I use C. Chatfield and G. Adams' *Proximate Composition of American Food Materials* for estimates of inedible refuse, calories, and protein.[10] The data on minerals and vitamins are from the unusually complete summary by A. D. Bowes and C. F. Church, *Food Values of Portions Commonly Used*.[11] In light of the foregoing remarks it should not be necessary to belabor the tentativeness of the figures.

The average nutritive values used are those of the foods as purchased. The losses due to waste and faulty preparation are ignored, as in most diet appraisals,[12] in part for the common reason that virtually nothing is known about the extent of these losses. But there is also the reason that these losses are largely avoidable, and a person who wished to minimize the cost of his food could reduce them to inappreciable amounts.

Methodology

The first step is to select a list of potential commodities; obviously the wider this list the lower the cost of the "adequate" diet will probably be. The list here chosen consists of the commodities for which retail prices are reported by the Bureau of Labor Statistics.[13] The list is reproduced in Table A, along with the nutritive values of one dollar's expenditures on each commodity.

The BLS list is a short one, and it excludes almost all fresh fruits, nuts, many cheap vegetables rich in nutrients, and fresh fish. It is beyond question that with a fuller list the minimum cost of meeting the National Research Council's allowances could be reduced, possibly by a substantial amount.[14]

Since the prices are averages of many (large) cities, the minimum cost diet will in principle be affected by seasonal price patterns and should be computed separately for each month. This effect will not prove to be great because seasonal foods play little

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[10] Department of Agriculture, Circular 549, June 1940.

[11] Privately printed, Philadelphia (5th ed., 1944).

[12] *Diets of Families of Employed Wage Earners and Clerical Workers in Cities*, Department of Agriculture, Circular 507, January 1939; *Family Food Consumption and Dietary Levels*, Department of Agriculture, Miscellaneous Publication 405, 1941.

[13] The commodities are described in *Retail Prices of Food*, 1923–36, Bureau of Labor Statistics, Bulletin 635, October 1937. The price quotations are averages of 51 large cities in 1939 and 56 cities in 1944; they were taken from the *Monthly Labor Review*, October 1939 and December 1944.

[14] A physiological chemist to whom I showed the diets recommended in turn a mixture he fed to rats, which would (in 1945) cost a man about $27 a year.

part in the minimum cost diet.[15] It may be noted also that since the prices are averages, they overstate the cost for a representative city because a food with lower-than-average price can be exploited and a food with higher-than-average price curtailed.

As a first step in finding the minimum cost diet, one may exclude any commodity all of whose nutritive values (per dollar of expenditure) are less than those of some other commodity. This procedure is carried a trifle farther in practice, by excluding also a commodity which is definitely inferior to another in its important nutrients and only slightly superior in others. For example, white bread (commodity no. 9) has less than half the nutrients (per dollar) of white flour (commodity no. 1) except for calcium, for which neither commodity is an economical source. This preliminary weeding reduces the list of eligible foods from 77 to 15, and excludes all meats except liver, all sugars, beverages, and patented cereals. The survivors are starred in Table A.

Thereafter the procedure is experimental because there does not appear to be any direct method of finding the minimum of a linear function subject to linear conditions. By making linear combinations of various commodities it is possible to construct a composite commodity which is superior in all respects to some survivor, and by this process the list of eligible commodities can be reduced at least to 9 (which are double starred in Table A). The nutritive values of each of these commodities is then expressed in terms of days' supply of requirements. Various combinations of commodities were used to fulfill certain nutrient requirements,[16] and the one finally chosen is presented in Section 4. There is no reason to believe that the cheapest combination was found, for only a handful of the 510 possible combinations of commodities were examined.[17] On the other hand the annual cost could not have been reduced by more than a few dollars by a better selection from these commodities.[18]

[15] Although it is possible that if the diets had been constructed with prices for some other month, other foods would have been chosen.

[16] An excess of calories is objectionable, but there is no reason to expect ill effects of moderately excessive intakes of the other nutrients. In the test of various combinations of foods, those nutrients (in addition to calories) which would, if fulfilled, necessarily imply fulfillment of other nutrient conditions were used in the algebraic solution.

[17] As a matter of fact, each of these combinations will have a different cost with each set of linear (nutrient) conditions, and there are many such nutrient conditions because excesses are in general unobjectionable.

[18] The nutrient with the highest cost (when secured from its most economical

The derivation of the minimum cost budget for 1944 follows the same procedure.[19] The surviving commodities surviving the first test are reproduced in Table B.[20] Because of computational limitations, fewer trial combinations were investigated but again no large reduction in cost is possible by further search.

It should be added that the content of a diet can be altered substantially without affecting its cost appreciably. In the process of finding the 1939 minimum cost budget several alternative budgets of only slightly higher costs were found among the most preferable commodities.[21] It also appears reasonable to suppose that the number of commodities could be increased materially without increasing much the cost of the diet, although the laborious calculations necessary to illustrate this were not undertaken.

The Minimum Cost Diets

The minimum cost diets for August 1939 and August 1944 are given in Table 2, and their nutritive values are compared with the National Research Council's allowances in Table 3. Consideration

TABLE 2. MINIMUM COST ANNUAL DIETS, AUGUST 1939 AND 1944

Commodity	August 1939		August 1944	
	Quantity	Cost	Quantity	Cost
Wheat Flour	370 lb.	$13.33	535 lb.	$34.53
Evaporated Milk	57 cans	3.84	—	—
Cabbage	111 lb.	4.11	107 lb.	5.23
Spinach	23 lb.	1.85	13 lb.	1.56
Dried Navy Beans	285 lb.	16.80	—	—
Pancake Flour	—	—	134 lb.	13.08
Pork Liver	—	—	25 lb.	5.48
Total Cost		$39.93		$59.88

source) is calories; it would require $24.50 to supply for a year the calories from flour (commodity no. 1). But then only 61 days' calcium would be provided, and the most efficient source (cheese, no. 19) could meet the deficiency only at a cost of $14.90, and the contribution to calories would be relatively small. The requirements for vitamin A and ascorbic acid would still be unfilled. Use of other commodities for calories yields a similar conclusion.

[19] The corresponding table of nutritive values can of course be secured simply by multiplying the entries in Table A by the ratio of 1939 to 1944 prices.

[20] It will be observed that three new commodities are added to the list. The BLS abandoned price quotations on 19 commodities in Table A (including one starred commodity, dried lima beans), and 12 new commodities were examined in making Table B.

[21] The minimum cost diet for 1939, which differs greatly from that for 1944, would have cost only 13 percent more than the latter in 1944.

of the lists in Table 2 will suggest reasons in addition to those given in the preceding sections for not recommending the diets.

The cost of the minimum cost diet rose exactly 50 percent from 1939 to 1944; the cost of food in the BLS index of retail prices of food rose 47 percent in the same period. The fact that the minimum cost diet, with its variable composition, increased slightly more than the (relatively) fixed-composition index of the BLS, is indicative of the fact (which the detailed data confirm) that the more efficient food sources rose relatively more in price.

TABLE 3. ADEQUACY OF MINIMUM COST DIETS, AUGUST 1939 AND 1944

Nutrient	Percent of Year's Allowance*	
	August 1939	August 1944
Calories	100	100
Protein	194	141
Calcium	100	100
Iron	425	245
Vitamin A	100	100
Thiamine	220	185
Riboflavin	100	100
Niacin	148	179
Ascorbic Acid	100	100

* The allowances are given in Table 1.

In this connection it is interesting to notice that the quantity of wheat flour is increased substantially between the two dates, although its price rose more than other eligible cereals. This is an artificial example of the Giffen paradox, that

> a rise in the price of bread makes so large a drain on the resources of the poorer labouring families and raises so much the marginal utility of money to them, that they are forced to curtail their consumption of meat and the more expensive farinaceous foods; . . .[22]

The purpose of the determination of the minimum cost diet will be explained in the next section, but in the light of comments of friends a few remarks (which are really a digression) may be added here. It is usually objected that relative prices would change if the commodities in Table 2 became the sole objects of demand. No one recommends these diets for anyone, let alone everyone; it would be the height of absurdity to practice extreme economy at the dinner table in order to have an excess of housing or recreation or

[22] Marshall, A., *Principles of Economics* (8th ed.), p. 132.

leisure. Waiving this point, all dietary studies accept the prices paid by consumers since these are the conditions of purchase which face the individual buyer. Moreover, any sensible system of prices will lead to similar results. If a society were so misguided as to adopt a minimum diet, it cannot be doubted that the prices of the commodities would fall once agriculture, transportation, food processing, and distributive industries were readjusted to this reduced task.

Comparison with Other Diets

It would no doubt be possible to cull from the literature a very large number of absurd estimates of the minimum cost of subsistence. Instead, I shall list a few restrained estimates by competent dieticians:

1. In 1936 Carpenter and Stiebeling described a minimum cost diet which "gives the cheapest combination of foods that it is desirable to use for an indefinite period," which cost (in 1935) about $125 a person.[23] (It would have cost about $100 in 1939.) A restricted diet for emergency use was also given; it cost $83 in 1935.
2. In 1939 Stiebeling and Clark estimated the cost of an "economical fair diet," as they unenthusiastically described it, at $78 to $104 per person in villages and cities. If the recommended classes of commodities are chosen from the BLS list, the 1939 cost would be about $94 and the 1944 cost about $138. This was explicitly stated not to be a minimum diet, but it was implied that much less was not tolerable.[24]
3. M. S. Rose presented an unqualifiedly minimum diet which would have cost about $115 in 1939.[25]

These low-cost diets of the professional dieticians thus cost about two or three times as much as a minimum cost diet.

Why do these conventional diets cost so much? The answer is evident from their composition. The dieticians take account of the palatability of foods, variety of diet, prestige of various foods, and other cultural facets of consumption. Primarily on such grounds

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[23] *Diets to Fit the Family Income*, Department of Agriculture, Farmer's Bulletin No. 1757 (1936), p. 10.

[24] *Yearbook of Agriculture*, 1939, p. 383: The diet is for families "in straightened circumstances"; it covers "average minimum requirements but does not afford as wide a margin of safety as desirable. . . . "

[25] *Foundations of Nutrition* (1935), p. 472.

can one explain their emphasis on meats and the inclusion of sugar.[26]

There are two fundamental objections to so merging the physiological and the cultural components of diet. The first is that the particular judgments of the dieticians as to minimum palatability, variety, and prestige are at present highly personal and non-scientific, and should not be presented in the guise of being parts of a scientifically-determined budget. The second reason is that these cultural judgments, while they appear modest enough to government employees and even to college professors, can never be valid in such a general form. No one can now say with any certainty what the cultural requirements of a particular person may be, and on its face it will always be impossible to determine a unique cultural minimum diet for 140 million Americans of transcendental variety of background, social position, and cultural values. If the dieticians persist in presenting minimum diets, they should at least report separately the physical and cultural components of these diets.

[26] Tax-supported bureaucrats and professors may also have another reason for certain of their practices.

ADVANCES IN THE TECHNIQUES OF MEASURING AND ESTIMATING CONSUMER EXPENDITURES

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IN RECENT years the study of consumer expenditures has been directed along certain lines determined by developments in the middle thirties. In the years 1934 and 1935 three books appeared that stimulated a wide interest in the possibilities of interpretation and analysis of expenditure data and two comprehensive nationwide surveys were initiated that brought modern survey techniques into this field of inquiry. The publication of "America's Capacity to Consume"[1] in 1934 focussed attention on the use of data from studies of family expenditures in problems of estimation and prediction of aggregate consumer demand. The book highlighted the need for data on consumer expenditures in relation to income on a nationwide scale that had been expressed in general terms in a publication of the Social Science Research Council in 1929.[2] The appearance of "Family Expenditures, A Study of its Variation,"[3] about the same time aroused interest in analyses of expenditure data in terms of stable relationships that can be expressed in a mathematical form. This work illustrated the possibilities of expanding our understanding of family consumption by more intensive analysis of existing information, although the data then available were small, scattered samples heterogeneous with respect to techniques and methods. The ingenious combination of data from various surveys into an estimate for the nation in "America's Capacity to Consume" and the use of many scattered studies as "experiments" to test the continuity or universality of relationships in "Family Expenditures" both indicated the need for a compilation and classification of the numerous studies of family expenditures that had been made in the last hundred years. Just such a comprehensive compilation and review of family living studies was published in 1935 by the U. S. Department of Agriculture as Miscellaneous Publication No. 223, "Studies of Family Living in the U. S. and Other Countries" by Faith M. Williams and

[1] Leven, Maurice, Harold G. Moulton and Clark Warburton, America's Capacity to Consume, The Brookings Institution, Washington, D. C., 1934.

[2] Social Science Research Council, Consumption According to Incomes. (Mimeographed) 1929. Second imprint, Washington, D. C., 1934.

[3] Allen, R. G. D. and A. L. Bowley, Family Expenditure, A Study of its Variation, P. S. King and Son, Ltd., London, 1935.

Carl C. Zimmerman. This work gave the student the complete inventory of materials at his disposal for pursuing any special types of analyses.

While the influence of these publications was spreading, several Federal agencies were engaged in the collection of two comprehensive bodies of data on consumer expenditures from families throughout the entire nation. The first of these, the Study of Money Disbursements of Wage-Earners and Lower-Salaried Clerical Workers, was limited, like the majority of earlier surveys, to a specific occupational group. This study put into practice many improvements in schedule design and content and introduced the use of systematic sampling methods. The second of the large-scale surveys, the Consumer Purchases Study, while not limited in coverage to certain occupational groups, was restricted to native-born families of specific family composition. This survey, built on the first, brought into operation a schedule carefully designed to provide the basis for analyses planned in advance and employed statistical sampling methods in the systematic selection of families interviewed that offered assurance of the representative character of the data collected.

The collection and analysis of data on consumer expenditures has been channeled in directions fixed by the work in those years. Emphasis was placed on the analysis of expenditure data in relation to income for the purposes of summarization, estimation and prediction. These uses of the data required nationwide coverage and representative samples. The association of income with expenditures introduced the important adjunct, the interrelationship of family savings with family income and family expenditures.

The results of the two large surveys, the studies of the Money Disbursements of Wage Earners and Lower-Salaried Clerical Workers and of Consumer Purchases, gave rise to a greatly expanded demand for such information to use in more and more detailed types of analyses. As the data are used, deficiencies in the methods of measurement emerge and indicate the need for investigating and testing techniques that promise more satisfactory results. At the same time the more extensive uses made of the data place increasingly rigid requirements on the quality of the basic data. Each successive survey design has been subjected to more exacting standards of accuracy. So long as the analyst was content with figures on the total clothing expenditure of families, both the

schedule and the sampling plan could be less carefully designed than is required by a demand for information on expenditures for felt hats, fur-trimmed coats and jewelry.

Problems of Measuring Income

The violence of the fluctuations in consumer incomes since 1929 and the increasing realization that the maintenance of consumer expenditures is fundamental to the maintenance of consumer incomes has resulted in increasing interest in recent years in the relation of consumer expenditures to income. Comparisons of estimates of aggregate consumer incomes, expenditures and savings, based on consumer surveys, with similar estimates based on material from other sources have revealed inconsistencies which have led to extensive analyses as to the reasons for the differences, with especial emphasis on the income side of the balance sheet in field surveys.

Definition of income. If income is to be obtained on schedules and questionnaires relating to family consumption and used in the classification of the expenditure data it must be precisely defined. The method of defining and measuring income for classification seriously affects the final analyses of the data. As yet, it can be said, there is no general agreement on the measure of income, with an attendant method of accounting, that can be expected to yield the completely satisfactory results for statistical analysis of expenditure data. The income measure for classification has to serve two purposes. It should give the most unambiguous relationships between income and expenditures for all types of goods and services. It should provide the most satisfactory measure of equivalence in economic level among groups in order to provide a basis for valid comparisons of variations in expenditure patterns. If the income measure used classifies in the low income brackets, families that are, in fact, relatively well-to-do, the expenditure data for the low-income brackets are subjected to serious distortions. If the income measure places in comparison families in two areas whose freedom of choice with respect to consumption differs very greatly, the purpose of the analysis may be defeated. Perhaps a single measure of income will never suffice for all the different types of analysis of expenditure data. Experience indicates, however, that improvements in the definition will offer more satisfactory material to the analyst and there will always be a need for a general type of classifi-

cation for the purpose of studying interrelationships among expenditures for goods and services of different types. The awareness of the deficiencies in the definition of income for the purpose of studying expenditures develops out of the analysis of the data. It is difficult to foresee all of the implications of a given definition, principally because the biases and distortions of the results depend in large part on the relative magnitudes of the various components in the income calculation.

The two comprehensive surveys of family consumption conducted in 1934–36, started with a concept of income that can be characterized variously as "spendable income," "income available for living" and "consumer income." This concept was made most precise in the case of farm income probably because the Department of Agriculture and many of the State Agricultural Stations had for many years been making special field studies of farm income and had developed schedule forms as a result of their experience in these studies which set the precedent for a relatively detailed form for use in calculating farm income. The problems of methodology relating to farm income were given careful treatment in the report of the Social Science Research Council on "Research in Agricultural Income"[4] which appeared in 1933. The concept of spendable income as applied to farm family income used in relation to the family expenditures is expressed there as follows:

"Spendable income—the gross money income of the farm business, less the current operating expenses of the farm, less expenditures for taxes and insurance on farm property and interest on mortgage debt, and less any expenditures for replacement of worn-out equipment or livestock, insofar as the new are not additions to the farm business plant. This income concept really attempts to calculate income that can be spent on farm family living, on enlarging the farm business or improving its types of equipment and livestock, on paying off the mortgage, or in various similar ways. As here defined it assumes that taxes, insurance and mortgage interest must be paid, and that tools, machinery, horses, etc., must be replaced exactly at the time they wear out. Under ordinary conditions, these are reasonable assumptions. The remainder after such outlays is probably the minimum which is *available for living* at any particular time. For example, on many farms in a period such as the present (1931–33) a part of the sum usually alloted to equipment replacements, mortgage interest and even taxes has been expended for family maintenance.

"This income concept, sometimes called also the *income available for living*, is probably suited to more uses than any of the foregoing in farm

[4] Social Science Research Council, Research in Agricultural Income, Scope and Method, John D. Black, Editor, New York City, 1933.

family studies; it is also especially suited to uses of income as a measure of buying power."

This concept of income had two clear advantages. It was the same accounting method as was used in the recording of family expenditures. The components in the measurement were paralleled in the estimates of aggregate net income of farm operators developed by the Bureau of Agricultural Economics.

Farm Income. The measure of family income from the farm so defined was interpreted on the schedule by a record of money receipts from farming by type of product, a record of "current operating expenses" payable during the report period, and a summary estimate of the value of the change in livestock owned or crops stored. Net money income from farming was determined by the difference between total money receipts and the total operating expenses, adjusted for the value of the change in inventory of livestock owned and crops stored. The farm expenses itemized on the schedule were as follows: hired labor for farm; livestock purchased; feed, hay, straw; fertilizer, spraying material; seeds, plants and trees; machinery, tools (repairs, replacements); gasoline, oil, tires, etc. for farm production; repairs on farm buildings and fences; taxes and insurance on farm property; interest and refinancing charges on farm mortgage; the farm share of expense for automobile and other farm expenses.

The items "livestock purchased" and "seeds, plants, trees" could both include outlays that increased the investment in the farm business. The entry of the value of change in the inventory of livestock owned and crops stored was offsetting in the case of the first of these items but the income calculation did not balance out the deduction of an investment item in plants or trees. Rent, interest and taxes on the entire farm including the dwelling were deducted as operating expenses but in the case of repairs and insurance the amounts allocated to family expense were excluded and recorded as family expenditures. The inclusion of all rent, interest and taxes was offset in the final calculation of total income, money and nonmoney, by an entry of the rental value of the farm home.

Because the constituents of total income from the farm had been obtained in as much detail, the deficiencies of the method of measuring income for the purposes of correlation with expenditures were easier to identify than in the case of nonfarm income. The element in the calculation that appears most seriously to have

affected the interpretation of the expenditure data was the classification of money spent for the replacement of farm machinery and equipment as an expense item. When the total outlay for machinery is deducted from the income of the current year a farm family making a considerable replacement in the year of the study is placed, for the purposes of classification, in a low-income bracket. The allocation of the purchases of a $1500 tractor, for example, to the current operating expenses of a farm unit with gross receipts amounting to $2500 could result in a calculated net income of less than $500. As a result, the group of families classified in the low-income brackets included an appreciable number with family expenditures characteristic of a much higher economic level. Average consumption for the lowest income brackets thus measured was above levels that could be rationalized either in terms of the consumption habits of other income groups or by comparison with the results of various small studies of low-income farm groups made about the same time.

The realization of the effect of the method of accounting in the case of machinery and equipment on the interpretation of the end results led to a change of procedure in the small sample survey conducted in 1942. Over all farm families the average expenditure for machinery and equipment purchased as replacements is an approximation for annual depreciation. Accordingly, in place of the purchases, which distorted the classification of families by income bracket, a depreciation allowance was used in the calculation of the current operating expenses.

The same type of difficulty is introduced by the inclusion of investment in plants and trees with purchases that are of the nature of upkeep as part of current operating expenses but since, over the entire farm population, such outlays are neither as large nor as frequent as purchases of machinery for replacement, the effect on the expenditure analysis was not as serious as the one just discussed above. Whether or not specific outlays can be logically placed in the category of operating expenses vis-à-vis investment, the mode of accounting may be questioned for the purposes under consideration. It is quite possible that a strict cash accounting might lead to an income total more closely correlated with the family expenditures than a total based on the assumption that farm expenses are paid before the family acquires any consumer goods or services.

Entrepreneurial income. Before 1935 the only studies of the incomes of individual nonfarm entrepreneurs had been made for in-

come tax purposes, in the light of the various definitions of income embodied in income tax legislation. There was no such body of experience in obtaining data on nonfarm entrepreneurial income in field surveys as existed in the case of farm income. The persons responsible for designing the income schedules used in the consumer income-expenditure studies of the mid 1930's were dissuaded from preparing schedules for obtaining the details needed to calculate the net income of nonfarm entrepreneurs by two considerations: (1) It was believed that small entrepreneurs do not keep the records required to calculate a true net income figure and that their transactions are so numerous and so varied that it would be more difficult for them than it is for most farm families to recall the amounts of their various transactions in such a way as to provide the data required for estimating net income; (2) It was believed nonfarm entrepreneurs who do keep the records necessary to compute net consumer income would strenuously object to recalculating them in a form different from the one used for income tax purposes. It was impossible to use the figure computed for income tax returns because the method of treating capital gains in the income tax law is not adapted to an income-expenditure analysis and because the period covered in the schedules obtained from individual families was very seldom that covered by their income tax returns.

In a study of family incomes made in the State of Minnesota, by the Minnesota Resources Commission[5] a separate section of the schedule was devoted to the details of income for the self-employed. This account was similar in form to the report required on the individual income tax return, Form 1040, Schedule D. The interviewers were instructed to inquire about the details of receipts, inventory change and business expenses in order to obtain the estimate of net income desired. Relatively few independent business or professional persons, however, could be persuaded to give the interviewers such detailed accounts. The experience in this survey and others covering this group indicates that such detail and the desired accuracy on the income report can probably only be obtained in specially designed studies having this information as their primary purpose. Such special surveys could give a basis for conversion factors between estimated totals and the net income derived from reports on details.

Wage and salary income. Wage and salary income was considered

[5] Minnesota Incomes, 1938–39, A Report on the Distribution of Family and Individual Incomes, Minnesota Resources Commission, St. Paul, Minnesota, 1942.

part of total spendable income after the deduction of a few items of occupational expense, namely, tools, equipment, books and periodicals, dues to professional associations and labor unions.

The items to be included as occupational expense and charged against income from wages and salaries are still the subject of debate. Some surveys have considered all outlays of this type as family expenditures. There are arguments, on the other hand, for including in the list of occupational expenses such items as special types of clothing required by the occupation. The list used in recent surveys comprises the items on which there exists general agreement and which do not require difficult distinctions on the part of the interviewer and the respondent. Occupational expenses, however liberally defined, would seldom amount to a sum that would alter the classification of the family by income bracket and accordingly affect the interpretation of the expenditure data.

Other types of money income. Income of other source types included in the total covered net rents, interest and dividends received, pensions, annuities and benefits, gifts and inheritances used for current family expenses and capital gains or losses from property bought and sold during the year.

The chief problems connected with the recording of money receipts from sources other than earnings are concerned with complete reporting. From the point of view of income definition, the treatment of the two items, gifts and inheritances used for family living and capital gains and losses from property bought and sold during the year have been subjected to some criticism. The inclusion of a portion of inheritances in the computation of current family income was an attempt to dispose of this troublesome item in the balance of the current year's income, expenditures and savings. The rule of allocation, however, presented so many difficulties of interpretation that the procedure has been abandoned in the more recent survey plans. Inheritances and large gifts are now simply recorded and not included in the income total and such sums appear as a separate item in the tabulations showing the balance of receipts and disbursements. Recent survey plans have also excluded from the income account capital gains or losses from property bought and sold, during the year, chiefly because of the difficulties of unambiguous enumeration on a general family expenditure schedule. Reports on property bought and sold are entered in a section of the family balance schedule devoted to the changes in

family assets and liabilities. Interviewing is simplified if all such transactions are recorded in the same way. This change is not an improvement from the conceptual standpoint since capital gains are recorded as decreases in assets.

Nonmoney income. In the Consumer Purchases Study total income was defined as the sum of money income from the sources listed above and nonmoney income in the form of housing, food and fuel. The treatment of the nonmoney income has also presented difficulties in the analysis of the consumption data.

Considering all families in the country, the value of owner occupied owned homes is the most important source of nonmoney income. The general method of measurement used derives a net value by subtracting from the family's estimate of gross rental value, the current expenses for taxes, interest on the mortgage, repairs and insurance. None of the nationwide studies of family expenditures have attempted a measure of depreciation to include in the list of housing expenses. The valuation of the net value of occupancy of owned homes is complicated in the case of farm families and nonfarm entrepreneurial families whose dwellings and business premises are part of the same structure. In the case of tenant farmers the method of calculating the farm income requires an evaluation of the value of the dwelling to serve as an offsetting entry.

The method of measuring the components of farm income has led to some confusion in concept. According to one approach certain of the outlays among farm expenses include charges that should be allocated to the family dwelling and hence be recorded as family living expenditures. In the case of the Consumer Purchases Study, these outlays were some proportion of the rent, interest and taxes paid on the entire farm. Accordingly, in the calculation of total income, the addition of an estimated gross rental value of the farm home serves first as an offsetting entry, representing the portion of such farm expenses that are allocable to the family dwelling. In the case of renting families, the entire value is merely an adjustment in the calculation. In the case of owning families, the value added is a compound of an offsetting entry and the net value of occupancy of the owned home, in other words, an estimated interest in the investment in the owned farm home. This is exactly the concept used in this and other surveys for nonfarm entrepreneurial families having outlays that cover the family dwelling and business premises.

The other approach attaches all outlays for rent, interest and

taxes to the farm business. The farm family receives from the farm business a dwelling rent free. The total rental value of this housing constitutes nonmoney income in the same sense that the housing that a farm laborer, caretaker or an employee of an institution receives as part of his reimbursement for services is considered as nonmoney income.

A choice between the two approaches is not necessary when the consumption data are classified by the total income of the family, including both money income and nonmoney income. It becomes serious when the income used for classification is defined as "money income." When it is remembered that the main purpose is to obtain an income total that offers the most rational and informative basis for comparison between groups, the use of the second approach in interpretation of the value of the farm dwelling means that in classification the farm family is placed in a lower income level than the nonfarm family in a similar situation. It also leads to a general comparison of the farm and nonfarm groups which contrast the disposal of the income of the farm family after the deduction of most housing costs with the same amount of income of the nonfarm family before subtraction of the expenses for family housing. It appears from such considerations that for the purposes of classification in the analysis of family expenditures the money income defined for farm families should exclude from farm business operating expenses charges allocable to the family dwelling and such charges should be recorded as family housing expense.

According to this approach, the nonmoney income from housing consists simply of the net value of occupancy of the owned home for farm as well as for nonfarm families. Whether this element of nonmoney income should be included in the income total used for classification depends on the kind of analysis of the expenditure data. The amount added to money income representing the net value of owned homes should place the home owner in an income class with renters having equivalent purchasing power. The whole aim of the classification might be to ascertain the effect of home ownership on the general spending pattern. Such an analysis can only be accomplished by comparing owners and renters in equivalent circumstances. If the amount added to money income as a measure of the net value of occupancy of the owned home is relatively large, such an analysis leads only to the tautological result: Owning families have less money income than renting families of

the same income bracket and spend less on all categories of family expenditures.

The same type of difficulty arises when the value of food produced for home consumption is included in the income total used for classification. The comparison of two farm areas, for example, via a definition of income equivalence that includes the value of home-produced food consumed by the family may not yield any more information on the contribution of the home-produced food to family welfare than is given by the income total and its components. When the amount of production for home use in two areas differs substantially and the value of such food is included in the income total, families with a low-money income in one area are placed in the same income class with families with substantially higher money income in the other area. The comparisons of the patterns of consumption in the two areas then leads simply to a contrast between the two levels of production for family consumption. Accordingly, if the analysis seeks more than the contrast between areas in the amount of production for family consumption, a classification by a measure of money income which does not include the value of such food consumed now appears more satisfactory. By pairing the families of the same money income in two areas differing in the extent of production for home consumption, it is possible to trace through the allocation to other consumption categories and savings any difference in the amounts spent for food that can be ascribed to the home production of food.

Evidence is now accumulating that suggests that the "saving" that arises from home production is definitely limited. Beyond a certain point increases in the total value of home-produced food consumed by the family do not lead to decreases in the amounts spent on the purchase of foods. The nature of this relationship has been indicated in a discussion in the Agriculture Yearbook, Food and Life, 1939.[6] The existence of such a limiting relationship explains why the classification by an income total including the value of home-produced food does not provide a more satisfactory basis for analyses of expenditure data. A dollar's worth of home-produced food does not release a dollar from food purchases that can be spent on clothing, medical care or towards the payment of debts on the farm. The importance of the home production is that it in-

[6] U. S. Department of Agriculture, Food and Life, Yearbook of Agriculture, 1939.

creases the food consumption of the family in most cases in such a way as to assure better nutrition.

Because of these various considerations the data from the 1941 survey, Spending and Saving in Wartime, were tabulated by money income. The definition used, however, did not allow for the accounting adjustments for the expenses relating to the farm dwelling. It is the opinion of the authors that, in terms of our present knowledge, the most satisfactory income total for general analyses of expenditure data is a measure of money income determined by taking out of the expense side of the income account all amounts chargeable to family living. Thus, all the costs of producing food for home consumption as well as the amounts representing the cost of the family dwelling should be included in consumer expenditures rather than in farm operation expense.

Biases in reporting income. The problems of determining the best measure of income to associate with expenditure data would beset the investigator even though the basic data on individual reports were perfectly accurate. The greatest difficulties arise out of the two types of biases that appear to be characteristic of reports on income voluntarily given to representatives of research agencies, whether government or private. The first of these, which may be called the refusal bias, results from a higher refusal rate in the highest (and perhaps also the lowest) income brackets than among the middle income groups. The second bias, which may be named underreporting, apparently is based on the inability or unwillingness on the part of many families to give a complete report on income.

The refusal bias is of serious consequence in connection with a study having as one of its purposes an estimate of the distribution of consumer units by the amount of their incomes. At the present time the persistence of the bias is accepted as inevitable, although the magnitude of the effect can doubtless be considerably reduced by employing more elaborate methods of approaching the group of respondents drawn in a sample. Since it does not appear possible to eliminate the bias entirely, methods of correction have come into use. The chief source of data used in such adjustments is the Federal Income Tax information. The income data from the Consumer Purchases Study, 1935-36 were combined by the National Resources Committee[7] with data from the income tax re-

[7] National Resources Committee, Consumer Incomes in the United States, Their Distribution in 1935–36, Washington, D. C., 1938.

turns in constructing the estimates of income distribution in those years. The difficult problems of making such adjustments are now being studied by income analysts.

The income bias has a serious aspect for the analysis of expenditure data. Without a valid estimate of the number of families in each income bracket, it is impossible to obtain from survey data estimates of the aggregate expenditure for each category of consumption or for specific goods or services. To date, family expenditure studies have not been found to be a good source of data for estimates of aggregate expenditures chiefly because of the underestimate of the number of families in the higher income brackets. Since, however, estimates of aggregate expenditures are prepared from other sources, the main loss in expenditure analysis is methodological. Without a means of deriving a good estimate of aggregate expenditures from survey data, it is impossible to compare the survey results with aggregates based on other data and thus appraise the quality of reporting on expenditures.

The underreporting of income would not be serious for expenditure analysis if it could be assumed that the understatement of income was uniform throughout all types of families and all income brackets. Unfortunately it appears that such an assumption is not justified. Comparing totals of income from various sources with the aggregates as estimated by the Department of Commerce, indicates that the underestimate of income from sources such as interest and dividends is greater than for other types of income. A detailed discussion of this kind of appraisal of the income data is given in the forthcoming bulletin of the Burreau of Labor Statistics on the results of the small sample survey, Survey of Spending and Saving in Wartime.[8] The variations in the extent of the underreporting of income probably tends to exaggerate the level of expenditure in most income brackets. The tentative results of comparisons of survey data with other data in the aggregates indicates that the underestimates of income are largely balanced by underestimates of savings. Consequently, the expenditures of those families classified by reported income in a lower bracket would tend to raise the average above the level truly characteristic of the group having in fact incomes of that amount.

It is possible that underreporting of income can be appreciably

[8] U. S. Department of Labor, Bureau of Labor Statistics, Survey of Spending and Saving in Wartime, 1941 and First Quarter 1942.

reduced by improvements in the design of schedules and the techniques of interviewing. The use of a schedule that provides for a recording of income receipts in detail promises an improvement in the completeness of reporting. In the comparison of aggregates mentioned above, it was found that farm income as reported on the survey showed the least deviation from the totals derived from other sources. The schedule form in the case of farm income carried much more detail than in the case of income from nonfarm sources. The increase in the number of individuals required to report their incomes on income tax returns will probably improve accuracy of reports made to survey interviewers.

The problem of underreporting is not limited to income. Savings, as already mentioned and many types of expenditures appear to be underestimated in family expenditures surveys. It is not possible to conjecture how much of the underreporting is the memory factor and how much is due to the fact that an interview covering a year's expenditures is necessarily fatiguing. The fact that such underreporting exists in data collected by the schedule interview method challenges the investigator to re-examine or explore other means of collecting such information.

Account Keeping vs. Schedule Interviewing

All comprehensive studies of family living expenditures in this country have used the schedule interview method in obtaining information from the families in the sample. In some other countries government surveys have been based on records kept by families. At first thought it seems that a day-to-day record of expenditures should lead to a complete and accurate account of family expenditures. Examination of the limitations of this method results, however, in the conclusion that the disadvantages considerably outweigh the advantages.

It would be extremely difficult, if not impossible, to obtain such records of a year's expenditures from a random sample of the nation's families. There is always a small group not sufficiently literate to be able to keep accounts. There is always a larger group that could not be sufficiently interested in the project to persevere without continued stimulus. Accordingly, the group able and willing to keep records is self-selected and hence not representative of the entire population. None of the European studies based on household accounts with which we are familiar present data on the

method of selecting the sample, or the percentage or distribution of refusals, or any material on the characteristics of the sample as compared with the total population. Even with a group interested in the idea of household accounts the ideal of a complete and accurate record is not reached without considerable effort. A study made by the Bureau of Home Economics in 1933, "Comparison of Schedule and Account Methods of Collecting Data on Family Living,"[9] among farm home makers revealed that since important omissions appeared in records, record keeping as a method should not be employed except with frequent visits to the family or a continuous editing and correspondence.

Another serious element to be considered is the possible effect of record keeping on the family spending. There have been no studies designed to show whether the general expenditure pattern might be altered when the family is constantly made aware of relative magnitudes through an account. Such an analysis has been made in the case of the seven day records of food purchases kept by families for studies of food consumption and the evaluation of diets. In these studies an interviewer calls on the housewife and takes an inventory of all the food on hand, on the shelves, in the refrigerator or stored in the basement. Each day of the week the housewife recorded her purchases. The interviewer called in some cases every day, in some cases every other day to assist the housewife in making this record. At the end of the week the agent took a second inventory of all the foods in the house. The analysis of the data from one of these surveys showed a significant decrease in the inventory of food on hand at the end of the week compared with the beginning. It thus appears that the daily visit of the agent and the recording of purchases influenced the families in the survey to buy less than normal amounts and to consume more than normal amounts from their shelves.[10]

The possibilities of record keeping have not been sufficiently explored and the method should not be excluded entirely from consideration by investigators. Inasmuch, however, as experience indicates that the collection of expenditure data by record keeping would require frequent visits to the cooperating families during

[9] Woodhouse, Chase Going and Faith M. Williams, Comparison of Schedule and Account Methods of Collecting Data on Family Living, U. S. Department of Agriculture, Technical Bulletin No. 386, Washington, D. C., 1933.

[10] Cornfield, Jerome, On Certain Biases in Samples of Human Populations, *Journal American Statistical Association*, Vol. 37, March 1942.

the year, the cost of this method of collection would exceed the cost of collecting the same amount of information by the schedule interview method.

In studies where the design requires that the data from individual families be analyzed separately, and there is, therefore, special need for accuracy in the separate returns the development of the record method may be required. For example, when it is desired to analyze the nutritive content of the diet of each family surveyed, to find out what proportion of those in each income bracket meet or fall below a given nutritional standard, it is generally felt that the reporting errors involved in housewives' estimates are large enough to make the use of the "weighted record" necessary, in spite of the difficulties of obtaining representative data by this method and the considerable expense of summarizing data entered in household account books, no matter how well they are designed for the purpose. When exact data are needed on the quantity of food consumed by each individual in each family a weighted record is required. The only studies of this sort made outside of institutions, with which the authors are familiar, have been carried out by investigators who entered the homes of the sample families and recorded the quantity of food placed in individual serving dishes and the quantity left when the dishes were removed from the table. The difficulties involved in obtaining representative data on this subject are obvious.

"Short" vs "Long" Schedule Forms

The schedule used in an expenditure survey needs to be designed so that the respondent can give the most complete and accurate report possible. The problem facing the investigator is to devise the best form and to develop the best method of interviewing to aid the housewife in reporting all of a year's expenditures. Prior to 1935 most expenditure surveys were summarized to show family outlay for the major categories of consumption such as food, housing, clothing, fuel, transportation and miscellaneous. (The most important exceptions are the studies of the expenditures of city wage earners and clerical workers made by the U. S. Bureau of Labor Statistics in 1918–19 and of white farm families in 11 States made by the U. S. Department of Agriculture in cooperation with certain colleges and universities in 1923–25.)

If the primary purpose of a survey is to provide average expenditures for consumption categories, the investigator must determine

how much detail should be placed on the schedule to assure the accuracy of these totals. The fundamental question is how accurate an answer can the housewife give to a single question such as the amount spent by the family for clothing during the past year. If such answers were reasonably accurate, that is, if overestimates by some families tend to balance underestimates by others, expenditure surveys would require only a short schedule and a short interview.

Experience has shown that few housewives have even an inkling of the magnitude of annual expenditures for the various categories of consumption. Such totals must be reconstructed by recording the details that the average housewife is able to report. The investigator has the choice of two methods of recording the information. The interviewer may use a form with headings similar to an account book and list all of articles and services that the housewife can remember under each heading. On the other hand, the interviewer may be given a schedule form that lists most of the goods and services purchased for family consumption and the respondent is asked to report on every item shown in the schedule.

The possibility of using a short schedule form requiring reports on total expenditures by category was submitted to formal test recently by the Bureau of Labor Statistics. The test was in two parts. In the first part nine homemakers who were interested in the problem took part in the experiment. They were asked first to report their best estimate of the totals spent for expenditures in groups without reconstructing from details. Then they reported on the details listed on a long schedule form. The groups of expenditures were food at home, food away from home, housing, fuel, light and refrigeration, household operation, furnishings, clothing, automobile, other transportation, medical care, personal care, recreation, reading, tobacco, education and miscellaneous. In this experiment, the housewives' estimates of the totals proved to be less than the total developed from reports on details on expenditures in all categories except food, transportation and recreation. The test showed that the consumer does not think of his outlays in terms of such broad groupings of expenditures.

The second part of the test survey was based on interviews with about 100 housewives chosen at random. A schedule itemizing expenditures in finer groupings was used and no restriction was placed on the amount of detail reported by the housewife in making her

estimate of the amount spent for any expenditure group. The respondents reported on income and savings as well as on expenditures. Approximately one-third of the schedules did not show a satisfactory balance between income, expenditures and savings as first reported. Revisions made at a second visit to the family resulted in increases in the total spent for 10 of the major groupings of expenditures, including the relatively large group, food at home, housing, household operation and clothing and in decreases for 6 groups. This test showed that a schedule listing only groups of expenditures and not specific goods and services yields reasonably satisfactory results in terms of a balanced report. On the other hand it also showed that respondents when left free, actually reported on expenditures for specific articles and services. The interviewers found it necessary to take voluminous notes on the interview and later had to spend several hours summarizing the results on the short schedule form. The time spent on the scheduling was not substantially less than had been required in studies using the longer, more detailed schedule form.

These tests led to the conclusion that a schedule form itemizing specific articles and services purchased for family living provided the best means of recording family expenditures in interviewing. They also revealed the difficulties in obtaining unambiguous reports on certain types of questions and thus made possible improved wording and arrangement of the schedule form.

There is one important exception to the procedure of estimating expenditures for a consumption category by reviewing the purchases for the specific goods or services that are included in the group. It would be virtually impossible for a housewife to report expenditures for specific foods without reference to a record of some sort. Earlier surveys, in particular the studies of the expenditures of wage earner families made in 1888–1902[11] and in 1917–19,[12] obtained estimates of the purchases of the separate foods from families in the survey willing to attempt such a summary. Since the accuracy of such reports is subject to question, such detailed reports on the year's food expenditures have not been included in any of the later studies. The Study of the Money Disbursements of Wage Earners and Lower-Salaried Clerical Workers (1934–36)

[11] U. S. Department of Commerce and Labor, Cost of Living and Retail Prices of Food, Eighteenth Annual Report of the Commissioner of Labor, Washington, D. C., 1904.

[12] U. S. Department of Labor, Bureau of Labor Statistics, Bull. No. 357, Cost of Living in the United States, Washington, D. C., 1924.

employed a supplementary food schedule covering one week's purchases. Such reports were obtained from the participating families in each of the four seasons and the estimates of annual purchases of each food were developed from the four seasonal surveys.[13] In the later surveys, the Consumer Purchases Study, 1935–36[14] and the Study of Spending and Saving in Wartime[15] the detailed schedule on the purchases of food during a week was obtained only during the period of enumeration on the main expenditure schedule and thus the food data were not representative of all seasons in the year.

In order to estimate food expenditures during the year, the housewife is asked to report average expenditures during a week or a month at different periods during the year. The schedules now used provide for recording of such averages by type of store such as grocery, meat market and bakery and require a separation between amounts spent for food purchased to be prepared at home and food eaten away from home in restaurants, and other eating and drinking places.

Test Surveys

The test surveys described above were the first formalized experiments of this type undertaken in connection with the development of the plans for an extensive survey of family expenditures. In a very real sense each survey constitutes a methodological test for the one that follows it. Surveys of family expenditures on a large scale were made as early as 1888 and the cumulation of experience from these surveys has contributed to a continual improvement in the schedule form and the methods of interviewing. It has been customary to "try out" each new schedule form by interviewing a few families before the form is set. Such trial interviews were, however, never, as far as we know, made part of a systematic test that could be summarized in quantitative terms until the Spring of 1944.

[13] Williams, Faith M. and Alice C. Hanson, Money Disbursements of Wage Earners and Clerical Workers, 1934–36, Summary Volume, U. S. Dept. of Labor, Bureau of Labor Statistics, Bull. No. 638, Washington, D. C., 1941.

[14] Stiebeling, Hazel K. and others, Family Food Consumption and Dietary Levels, Five Regions, U. S. Department of Agriculture, Misc. Pub. No. 452, Washington, D. C., 1941 and U. S. Dept. of Labor, Bureau of Labor Statistics, Bull. No. 648, Family Expenditures in Selected Cities, 1935–36, Volume II, Food, Washington, D. C., 1940.

[15] U. S. Department of Agriculture, Miscellaneous Publication No. 550, Family Food Consumption in the United States, Spring 1942. Published as a part of the Study of Family Spending and Saving in Wartime, conducted by the Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, in cooperation with the U. S. Bureau of Labor Statistics, Washington, D. C.

As the data from expenditure surveys are used for more and more types of analysis, it becomes necessary to add new questions to the schedule and make certain changes in the customary list of information. Thus, each projected survey includes information on the schedule for which there may be little or no experience in the earlier surveys. The introduction of a test survey as part of the planning operation provides a basis for designing the schedule in a form to give the required information as accurately as possible.

For the sytematic improvement of the techniques of collection of data on family expenditures two types of studies would be eminently desirable. In the first place if inventories of experience could be made generally available, investigators might be prevented from making the same old mistake in each successive study. Such inventories would be in themselves an analysis of the expenditure data and would rely heavily on comparison of survey total with aggregates based on data from other sources. Second, studies in methodology could be made, independent of the immediate need for their use in connection with an extensive survey.

Definition of Expenditures

The classification of family expenditures required for the purposes of analysis imposes some serious difficulties in the recording of expenditures whether in a record account or in a schedule interview. For analysis, expenditures must be grouped uniformly by some criterion. On the other hand, families often and, in some situations, generally make payments that represent combinations of two or more types of expenditures which the investigator wants reported separately. The most common types of "combined" payment are, first, expenditures for goods and services that serve both family living and the family business, and, second, outlays that represent both current family living expenditures and savings.

The rational separation of family living expenditures from family business expenditures is a subject that requires considerably more attention and could well be made the purpose of the special type of study suggested above. The problem appears in the recording of expenditures for almost all farm families and for a large segment of the entrepreneurial nonfarm group. Some of the methods of allocation have already been discussed in connection with the definition of income, for the measurement of net income as well as of expenditures is affected by the definition of "family" expenditure. In addi-

tion to expenditures common to the business and the family dwelling the problem of allocation extends to the business and the family use of an automobile, and the fuel and utility charges that apply both to the business premises and the family living quarters.

Except in the case of the farm dwelling, the procedure now generally used relies on a percentage allocation estimated by the respondent. Thus in the case of automobile expenditures, the family is asked to report the total expenditures for the purchase and upkeep of the automobile and to give a percentage that represents the proportion that business use of the car is of the total. This percentage is then applied to the various components of the total, such as gasoline, oil, repairs, licenses and insurance. The subjective element in the report on the percentage allocation is clearly an obstacle to the interpretation of the results and renders difficult the comparison of the family situations in different areas or at different times. Furthermore, the division of certain purchases into the two sectors of expense results in almost meaningless figures for analysis. It is doubtful whether a comparison between areas of the portion of the amounts spent on automobile licenses and insurance allocated to the family living side of the account contributes any information leading to an understanding of differences in the use of automobiles. In the recent Survey of Spending and Saving in Wartime, the totals for automobile purchase and operation were separated between family and business use in the tabulation of the data but the details of expenditures for gas, oil, repairs and licenses were not so allocated.[16]

The data from family expenditures surveys would be improved if more objective methods of dividing outlays between family expenditures and business expenses could be developed. In the case of farm families, for example, special studies of the use of the automobile in representative farm areas could contribute the basis for a set of uniform rules that could be used in general surveys. Even if such studies did not attempt to provide the quantitative information required for prorating, they would contribute to the improvement of survey techniques by clarifying the meaning of such a term as "family use of the automobile" and making it possible to use the same definition for all groups in the population.

The difficulties of separating certain outlays into the parts to be

[16] U. S. Department of Agriculture, Miscellaneous Publication No. 520, Rural Family Spending and Saving in Wartime, Washington, D. C., 1943.

charged to family living and to savings have proved to be almost insurmountable. In the case of insurance, an effort was made to obtain the details of insurance coverage in a study of the expenditures of Federal Employees made in 1934. This survey showed that even among the professional group, families can not within the time available in a field survey report enough information on their policies to provide a basis for estimating the division of a premium payment between insurance and the savings features. A study of family life insurance made by the Temporary National Economic Committee in 1939[17] showed that an intensive survey on this subject alone would be required in order to obtain an accurate allocation of the insurance premiums paid. Accordingly, the schedules used in expenditure studies require no information on the family life and endowment insurance beyond the amount of the premiums paid and the frequency of payment. Insurance payments, surrender or settlement of policies by economic bracket are certainly subjects that deserve special study independent of a connection with a general family expenditure survey.

The separation of mortgage payments on the owned home into interest and principal has become increasingly difficult for the investigator. It is clearly desirable to count the principal payment as part of the family's savings and investment program. While many families are able to report the amounts paid on principal, there are a great number unable to provide the details of the amortization payments and unwilling to give all of the information on the mortgages necessary to calculate the component parts of the payment. Payments today may also include taxes and insurance so that the recording of the details of expenditures on owned homes in family expenditure studies is being subjected to an increasing error of enumeration. Schedule forms requiring details on the mortgage are now being tried and some solution to the problem may emerge from these experiments. It is quite possible, however, that it will prove necessary to return to the simple method of recording used in surveys prior to 1934 and to effect the separation of the aggregate payments on mortgages by some national rule in the final tabulations of the data.

The separation of payments into significant components for anal-

[17] Senate Committee Print, 76th Congress, 3rd Session, Investigation of Concentration of economic power. Temporary National Economic Committee, Monograph No. 2, Families and Their Life Insurance, A Study of 2132 Massachusetts Families and Their Life Insurance Policies. Washington, D. C., 1940.

ysis applies also to many parts of the family expenditure account. How should an expenditure for board and room be allocated to food and housing? How should a payment to a boarding school be divided between education, food, housing and other expenses? Can families provide a reasonable basis for the separation of a hospital bill into hospital care, nursing service and drugs and supplies? To date it has been customary when possible to obtain from the family an estimate for such allocations and in other cases to record details on the payment that would give a basis for editorial distribution into the required components. Here again, the improvement of techniques used in general expenditure studies would be greatly aided by various types of special studies.

Coverage of Expenditures

An interview with a family on a year's expenditures is time-consuming and experience has shown that in order to obtain unbiased estimates of expenditures for the main consumption categories it is necessary to record outlays for most of the specific goods and services that enter into family living. For analysis of family expenditures the value of the information on the details of expenditures cannot be overstressed. Yet to obtain reports on the details of expenditures sufficiently accurate to use in analysis means adding to the time required of individual respondents. A family, after becoming interested in the survey, may be willing to look up a few records or receipts in order to clarify entries on the schedule. There appear, however, to be definite limits within which such participation can be expected to operate.

Consideration is now being given to survey designs that reduce the burden on the individual respondent. The most promising proposal involves a set of interlocking surveys, each limited to one aspect of family expenditures. One survey, for example, would cover only clothing expenditures, another medical care expenditures. The schedules for each subject could be more detailed than the general expenditure schedule and more time could be used in interviewing without overburdening the respondent. The data from all the surveys added together would provide the pattern of family expenditures, provided the samples in each case had been carefully chosen for this purpose. In order to classify the families each survey would have to obtain data on family composition, occupation, income, residence and certain other facts.

This proposal would lead, without doubt, to an improvement in the expenditure data for each category of expenditure. Its use would mean the loss of the general criterion of acceptability of a report in the reasonable balance of income, expenditures and savings. It would also absolutely preclude any studies of the correlations between expenditures of different types among families in the same economic bracket. Furthermore, a study based on a set of interlocking surveys might prove to be much more expensive than a single survey in which the schedule covered all categories of expenditures.

The scheme of interrelated surveys could be developed in such a way as to retain the information needed for special correlation studies. A central survey using the complete expenditure schedule could be accompanied by related surveys on the more important groups of expenditures on which accurate detailed information is desired. This type of survey design has been illustrated by the use of a supplementary food survey in all of the expenditure studies since 1934. The food survey, covering a sample of the families reporting on expenditures, obtained a record of family food consumption during a week that was sufficiently accurate to allow an analysis of the nutritional content of the diets. Such supplementary surveys do not need to be restricted to the families interviewed for information on a general expenditure schedule. It is only necessary to have the samples related in such way that the data from the supplementary survey can be extended by reference to the findings of the general survey. This means that the schedules for the supplementary surveys have to carry the information about the family required for classification, such as income, occupation and family composition. The scheme of interrelated surveys is simply an extension of the "double sampling" that originated with the Consumer Purchases Study.[18] The many possibilities of survey design using some method of double sampling remain to be explored not only as a means of reducing the costs of family expenditure studies but also as a technique for providing accurate information on the various aspects of family consumption.

Classification of Consumer Expenditure

Many of the goods and services purchased by the ultimate consumer fall into natural groupings about which there is little to de-

[18] National Resources Committee, Consumer Expenditures in the United States, Estimates for 1935–36, Washington, D. C., 1939.

bate, and which are generally uniform from study to study. There are other items about which there has been considerable variety in practice. Some investigators have been more interested in classification by the source of the goods purchased; others in their use. Present practice tends to emphasize the kinds of goods and services purchased, rather than their use by the family reporting. Questions have arisen as to the place where amounts spent for food consumed by guests or for meals consumed by the family away from home (other than at work or at school) should be entered—under "recreation," or under "food"; whether expense for wines and liquors should be classified with expense for "food" or with expense for "recreation." Recent studies have included both these items with food. Similar questions have arisen over the classification of expenditures for food, lodging and carfare while travelling. The Bureau of Labor Statistics study of 1917–19, called for expenditures for excursions, vacation, and travel as separate items and the instructions for the study said to include under these items "all expenses such as railroad fare, board and lodging while away, etc. Vacations include trips for pleasure away from the city which involve a stay over one or more nights." It is hard to imagine the heartsearchings of the housewife who had to decide whether the trip to visit an elderly uncle was undertaken for pleasure or duty. Present practice is to classify all travel under transportation without any felicific calculus, to ask for outlays for meals while travelling (except at employers expense) or on vacation as one item, to be classified under outlays for food, and for lodging while travelling or on vacation as one item to be entered under housing.

Some studies have placed outlays for luggage with clothing, others with housefurnishings. Most investigators have included jewelry with clothing expense; others have placed it with "miscellaneous" items.

The classification of expenditures for laundry and dry cleaning poses further problems. Since most dry cleaning expense applies to clothing it is usually classified with clothing outlays, and since most laundry expense, at least for moderate-income families, applies to sheets, towels and other household items, and it is impossible for families to separate their expense for these items from their expenditures for laundering clothing, it is usually classified with household operation.

The schedules used in interviewing consumers as to their expenditures are usually arranged in such a way as to facilitate the recall

of expenditures made over a period of time. When it is desired to obtain summary figures on expenditures in terms of some other grouping as for durable, semi-durable and nondurable goods, and for services, it is necessary to code each item and to resummarize the figures. The great advantage of the expenditure study that records and tabulates all of the details is that such regrouping is made possible. When the data are published in detail the results of various studies can be put on a comparable basis independent of variations in the classifications used.

Measurement of Savings

In early studies of family incomes and expenditures, no details were requested on the family savings. The usual procedure was to ask for income, family expenditures in more or less detail, and then to add line which said "Surplus or deficit." The instructions for the Bureau of Labor Statistics study of 1917–1919 said

"Surplus or deficit means the difference between the income and expenses for the year. This should be asked first as an independent question, then the difference between the itemized income and expenses should be computed. If the figures arrived at by the two methods are not the same, the figures of one item or the other must be revised. The schedule when turned in must be consistent as between income, expense, and surplus or deficit. As the figures of a schedule generally must be estimated, do not show a surplus or deficit of less than $5.00, but cover such small amounts among the items."

This procedure seems to the authors to encourage "adjustments" in the figures provided by the family to a dangerous point.

Details as to family savings were apparently obtained in studies of the economics of farm family living earlier than in studies of the economic affairs of city families, in investigations of changes in family "net worth."

The present practice in both the Bureaus of Labor Statistics and of Human Nutrition and Home Economics is to require that total receipts (including increase in money borrowed or in accounts due) should balance against total current expenditures and increase in assets within 5 percent in the case of nonfarm families and 10 percent in the case of farm families. The larger tolerance is allowed in the case of the farm families because of the complications of calculating income from farm transactions. Changes in assets and liabilities are then requested in detail when the survey attempts to cover the whole range of the family economic situation. The studies of the mid-1930's devoted an entire page to changes in assets and

liabilities. This procedure provides valuable data as to amounts spent on repayment of mortgages, increases or decreases in amounts owed on installment debts, or to small loan companies, purchases of stocks and bonds by consumers in different income brackets. It encourages the interviewers and the families who cooperate in consumer surveys to look over the entire schedule for possible errors, when the figures first obtained do not balance within the prescribed limit of tolerance instead of taking the difference between the figures first recorded in the income and expenditure sections and calling it "surplus" or "deficit."

As noted below, the aggregate figures on savings obtained in family expenditure surveys are considerably below other estimates on the subject. The apparent underestimation indicates that families either forget amounts they have saved, or that they are more reticent about savings than about expenditures, or a third possibility, that having for one reason or another underreported income, they find it more convenient to scale down on savings when the interviewer points out that total receipts or total disbursements are out of balance.

Interest in the detailed information on family savings from family expenditure surveys has been increasing rapidly. Such information is of value not only in relation to a special subject such as installment financing but also in relation to the analysis of family expenditures. The data on changes in family assets and liabilities obtained in the three surveys, the Study of the Money Disbursements of Wage Earners and Lower-Salaried Clerical Workers, the Consumer Purchases Study and the Study of Spending and Saving in Wartime may be considered as experimental in character. The schedule form, in the case of the first two surveys, had to be developed without reference to any extensive background experience and in the case of the third, before sufficient analysis had been made of the results of the earlier studies. This particular part of the record of family financial transactions present serious problems of schedule design and interviewing. In order to provide detailed information of analytical value many changes will have to be made in the schedule form as it pertains to this subject. The character of such changes, however, awaits further study of the data along the lines of the analyses of the information on intallment financing.[19]

[19] Bernstein, Blanche, The Pattern of Consumer Debt, 1935–36. A Statistical Analysis, National Bureau of Economic Research, New York City, 1940 and Revis Cox, Installment Buying by City Consumers in 1941, U. S. Bureau of Labor Statistics Bulletin 778, Washington, D. C.

Estimates of Total Consumer Expenditures

Comparisons of data on aggregate consumer income and expenditures obtained by the most recent complete field survey on this subject (the Study of Spending and Saving in Wartime in 1941) with the estimates of the Department of Commerce for that year, although difficult to interpret, give the best basis for appraising the completeness of reporting in surveys. The Department of Commerce figures are based in large part on the Census of Manufactures and on reports of retail sales which are used in combination with data from the Department of Agriculture and many other sources. None of the material included in the Commerce estimates is based on information obtained directly from consumers except the value of food and fuel produced and consumed on farms, and the value of owned homes and tenant-occupied farm homes. The figures on the aggregate money income of consumers from the survey of Spending and Saving in Wartime represents 88.7 percent of the Department of Commerce figure for income payments in 1941.[20] The survey figure on total consumer expenditures (including goods and services received in kind) is about 93 percent of the Department of Commerce figure.[21] (The material on housing in the two sets of figures is presented so differently that it is impossible to calculate comparable figures on *money* expenditures for this reason alone, without going into the data which lie behind the final estimates.)

The relationships between the national estimates from the two sources vary considerably among the various groups of goods and services. Some of the differences are relatively easy to explain, the reasons for others remain to be explored.

The survey figure on money expenditures for food is about 94 percent of the Department of Commerce figure. The survey figure on the value of food received in kind is almost two and a half times the Department of Commerce figure. The difference in the figures on value of food in kind occurs primarily because the Department of Commerce uses an estimate of the value of food produced and

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[20] U. S. Department of Labor, Bureau of Labor Statistics, Survey of Spending and Saving in Wartime, Family Spending and Saving in Wartime, Bulletin in preparation.

[21] Shaw, William H., Consumption Expenditures, 1929–43, Survey of Current Business, June 1944.

consumed on the farm from the Department of Agriculture which is based on the prices which farmers receive. The Bureau of Human Nutrition and Home Economics used an estimated average retail price in the valuation of the food produced on the farm for family consumption. Another and less important reason for the difference in the estimates is that Department of Commerce figure does not include the value of food raised by nonfarm families for their own use.

The survey estimate of clothing expense is about 91 percent of the Department of Commerce estimate. One important reason for the difference is to be found in the figures on expenditures for jewelry. Both these figures include jewelry under clothing but survey figure excludes jewelry purchased for gifts to persons not members of the family. The survey figure for expenditures on jewelry is nevertheless strikingly low. Perhaps, as a people, we inherit from our Puritan ancestors an uneasy feeling that expenditures on jewelry are unduly frivolous, and find it easy to forget them when faced with an interviewer and an expenditure schedule.

The survey estimate of the value of housing, fuel, light and refrigeration to consumers in 1941 is substantially larger, about 20 percent, than the Department of Commerce estimate. In this case, as noted above, it is, at present, impossible to give an explanation for this difference.

In general, the aggregates based on the survey data are lower than those estimated by the Department of Commerce. The reasons for these differences are now being explored for the purpose of revealing the deficiencies in survey techniques that can be eliminated. The primary problem is concerned with associating a discrepancy with underreporting of expenditures or with the greater refusal rates in the higher income groups. The data quoted from the 1941 survey had been adjusted for the sample bias due to refusals on the basis of information contained in the sampling records of the survey. This adjustment may not have completely eliminated the error arising from this source. In order to interpret a discrepancy as underreporting, it is necessary first to make the maximum reasonable allowance for the sample bias. The complete analysis of the comparison of the two types of estimates of consumer expenditures will add considerably to our understanding of the problems of obtaining satisfactory data in family expenditure surveys.

Prospect 1945

It seems clear that, in the process of finding solutions to the economic problems that will be raised during the reconversion period, we shall need to develop our techniques of obtaining data on the factors affecting consumer expenditures at different income levels in the United States and in the other countries which are rebuilding their economies after the economic maladjustments of the war period. We need techniques for getting reports on over-all changes in consumer expenditures by income level for the total population of an area, which will yield results which can be used for administrative purposes in a relatively short time after the period to which the data apply. We need improved techniques for obtaining figures on the details of consumer expenditures by income level, occupational group and regions within an area, which will necessarily take a longer time than the over-all picture and yet which must be supplied within a relatively short interval. In the opinion of the authors, the improvement of techniques for obtaining data on consumer expenditures will require some controlled experiments in which different collection methods are used with samples of the same size and character drawn in urban and rural areas. Except for the small experiments conducted by the Bureau of Home Economics in 1926 and 1927 and by the Bureau of Labor Statistics in the Spring of 1944, there have been no studies undertaken simply for the purpose of testing the results obtained by different methods. The subject of variations in consumer expenditures by income is now generally recognized to be of such great importance that it seems likely that the need for improving our research techniques in this field will be recognized after the military victory is won. After we have accomplished the defeat of the Axis powers, we shall have another war to wage, the war against want, and a knowledge of the factors which affect consumer expenditures and of the relation of such expenditures to the well-being of the world's population will be one of the weapons that must be used in fighting the war. It is the responsibility of the social scientist to see that this weapon is well made.

NOTES ON "POOR LAND," AND "SUBMARGINAL LAND"*

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WE AS a nation seem to have come into a situation where careless talk about *poor* land, *submarginal* land, and the like, may lead us into mistakes in policy that may plague us for generations. "There is no use talking," remarked one farm economist, "about *improving* the practices on the farms in the southeastern corner of our state. It's just poor submarginal land and nothing can be done with it that will make it yield a decent living for its inhabitants." From another state: "The difficulty with the rehabilitation loans made in our state is that they have mostly been made on poor land that nobody should try to farm anyway." From still another: "The Soil Conservation Service has been trying to reclaim and get back into agricultural use a block of land in our state that is so completely run-down that it should simply be left to grow up into trees. To put families on it is only to deceive and persecute them."

The report of the Special Committee on Postwar Policy of the Association of Land-Grant Colleges and Universities speaks in terms of "reasonably productive land," or "land that can easily be made productive." It disapproves of making rehabilitation loans to keep families on "unproductive, uneconomic farms if there are better opportunities elsewhere." In the discussions before the Colmer Committee in Chicago, however, the terms "poor" land and "good" land were used freely; also the terms "efficient farmers" and "inefficient farmers."

Confused by the promiscuous use of the classification *poor land*, the writer asked one of its users for a definition of it. The reply was: "It's simply land of low productivity per acre." *Gross* or *net*, was the next question. "Well, *net*, of course" was the answer.

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* The writer was assisted in the preparation of this article by eight different persons in the Department of Agriculture and at the University of Illinois, not all of whose names are cited in the footnotes and in the text. He could not have written the article without their assistance. In particular, he is indebted to Professor L. J. Norton and Professor R. S. Smith of the University of Illinois. Neither of these men nor any of the others is responsible for any statements in the article, particularly not for the interpretations and recommendations of measures. The writer was assisted by the staff of the Committee on Research in the Social Sciences of Harvard University. This is Publication Number 14 in the publication series of the Seminar on Agricultural Policy in the Littauer School of Public Administration.

"Then all the ranch lands of the country are poor land," the writer remarked. Reply: "I wouldn't say that. They are fertile enough. They just don't have enough rainfall to be very productive."

"But they yield some pretty good incomes for their operators," the writer insisted. The average incomes year-in and year-out of the cattlemen and sheep raisers are higher than those of the dairymen and corn-and-hog farmers. For that matter, so are the incomes of the wheat farmers of most sections.

Area and Productivity

Further questioning made it clear that this farm economist was thinking of productivity mainly as if it was a matter of the chemical plant nutrients in the soil, and also as if it must be *measured only by the acre.* Let us take up the second of these first. It should be obvious that for much economic analysis, productivity needs to be measured *per man unit* and not *per acre*—in terms of *the net product from the amount of land that one man can handle.* For taxation and related purposes, and no doubt some others, we need to use net product per acre as a measure. But we should not carry this unit of measurement into analysis where it does not fit, such as analysis of farm incomes, or size of operating units, or as we shall see later, submarginality.

Area as such has much significance, of course. If to get a given volume of a certain product, farm equipment has to travel over twice as much land surface on one farm as upon another—to turn over, or disk, or seed, or cultivate, or harvest twice as many acres—the inputs of all the cost factors are larger; they can be twice as large. But with the great cheapening of power that has occurred, increasing speed of travel, and rubber treads, area is far less important than it was. The number of plows, disks, or harrows, hitched to a tractor, can be doubled and the larger area covered in the same total time. The cost of the extra investment in equipment that might be needed has been reduced by the lowering of interest rates.

Often, moreover, the products of the two farms will not be the same. The "poorer" land may be farmed less extensively than the other. More of it may be in pasture and less of it in crops, or more of the crop land may be in small grain and hay and less in row crops. Under these circumstances, the inputs will be less per acre along with the outputs—not enough to leave the same net product

per acre, but commonly enough to yield the same net product per unit of labor, capital and management. At least, this appears to be the situation when we compare farming in the dairy regions and the Corn Belt with that in the Great Plains.

Two Illinois Counties

When "poor" land and the "good" land are found in the same general territory, with the same climate and rainfall, they may grow about the same crops and support about the same livestock, although probably in different proportions. An example of this kind appears in a table that is published in the recent report on *A National Postwar Fertilizer Policy*, published by the National Planning Association.

According to the figures in this table, an acre of average Douglas county soil has around twice the minerals and plant nutrients found in an average acre of Jasper county soil, and the yields per acre are around twice as high; and the gross value of product of the Douglas county farms averages nearly four times that of Jasper county farms, even after allowing for the value of the produce used by the farm families, which was a little higher in Jasper county.[1] Per acre, the differences in value of product are somewhat less, because the Douglas county farms average a third larger than the Jasper county farms.

These counties were especially selected by the Bureau of Plant Industry, Soils and Agricultural Engineering of the United States Department of Agriculture, with the help of the soil scientists of the University of Illinois, in order to show the effect of differences in soil fertility on agriculture and its people. (They recognized, of course, that other soil factors than fertility contribute to the productivity of land.) These two counties lie closely together, with only two counties between them. Douglas county is the next county south of Champaign county, where the State University is located. It lies in what was called "the cash-grain area" of central and eastern Illinois in the 1930 type-of-farming survey. At that time, 61 per

[1] Averages in such a situation are deceptive. We are concerned here primarily with the uplands of the two counties. The Cisne silt loams of Jasper county, the dominant upland type, have three times higher yields than the Flanagan silt loams of Champaign county. According to Professor R. S. Smith of the Illinois Agricultural Experiment Station, the average yields of the Cisne silt loams, 1912–43, were—corn, 11 bushels; oats, 9 bushels; and soybeans, 7 bushels. In a corn-and-oats rotation, the Flanagan soils averaged, 1904–40—corn, 34 bushels; oats, 34 bushels; and in a corn-oats-clover rotation—corn 47 bushels; and oats, 49 bushels.

cent of the farms in Douglas county were classified as *cash-grain*. This means that 40 percent or more of the gross value of their products was obtained from sales of corn, oats, and/or wheat. If such a classification were made today, of course, soybeans would figure largely in the cash receipts. Only 11 percent of them were

TABLE 1. SOIL FERTILITY AND AGRICULTURAL WELFARE IN TWO ILLINOIS COUNTIES[a]
(Compiled from Illinois Soil Survey Reports and U. S. Census of 1939)

	Unit	Jasper County Low Fertility	Douglas County High Fertility
Soil Analysis	lbs. per acre[b]		
Organic matter		43,100	96,500
Nitrogen		2,600	5,000
Phosphoric acid		1,700	2,750
Potash		30,000	42,000
Calcium		5,500	12,000
Magnesium		4,500	10,000
Farm and Equipment—Average per farm			
Land	acres	120	184
Land and buildings	dollars	4,040	24,080
Farm machinery	dollars	400	1,530
Tractors	number	.33	.97
Electricity in homes	percent	13	36
Crop Yields—per acre			
Corn	bushels	34	54
Oats	bushels	18	31
Soybeans	bushels	12	28
Farm Income—per farm			
Farm products sold, traded, or used at home	dollars	965	3,530
Education			
Adults attended high school	percent	7.8	23.4
Adults attended college	percent	3.7	6.4
Relief			
Farm labor force employed by WPA	percent	5.5	2.8

[a] Smith, R. S. and Smith, L. H., "Jasper County Soils," Illinois Agricultural Experiment Station, Soil Report No. 68, 1940.
Smith, R. S., DeTurk, E. E., Bauer, F. C. and Smith, L. H., "Douglas County Soils," Illinois Agricultural Experiment Station, Soil Report No. 48, 1929.
[b] Surface soil in one acre equals 2 million pounds.

animal-specialty farms—that is, farms in which 40 percent of the income was derived from the sale of hogs and/or beef cattle. Of the remaining 28 percent, 18 percent were classified as *general* farms—that is, mainly farms whose income was distributed more or less equally between sales of cash grain and sales of livestock.

Jasper county, in contrast, lies in that southern third of Illinois which is described by the soils men as having a tight claypan.

(These soils are now called Planosols.) Around thirty percent of the area of Jasper county was timbered when the white man came, and only ten percent of Douglas county. Moreover, the Prairie soils of Douglas county supported a much heavier and taller growth of grass.[2] The upland soils of Jasper county are thoroughly weathered and badly leached, whereas those of Douglas county are slightly weathered. This largely explains the differences in the amount of organic matter in these soils.

TABLE 2. LAND USE IN TWO ILLINOIS COUNTIES, 1940
(County Averages)

	Douglas County		Jasper County	
	Acres per farm	Percents	Acres per farm	Percents
All land	184	100	120	100
Crop land	139	76	66	55
Pasture	21	11	28	23
Woodland	5	3	6	5
Crop failure and idle	11	6	8	7
Other	8	4	12	10

Table 2 shows the effect of the difference in land types on the use of the land. Considerably more of Douglas county is in crops and less of it in pasture. When the farm organizations are examined in detail in Table 3, it will be seen that the same crops are grown in both counties and the same livestock are raised, but the proportions vary greatly, especially in 1940. Douglas county is now mainly given over to the growing of corn and soybeans. Part of the grain is fed to hogs and cattle. The Jasper county farms feed relatively few hogs. About all of the grain is fed to the cattle and workstock and to the sizeable farm poultry flocks. Only 1 per cent of the farms in Jasper county were reported as *cash-grain* in 1929 and only 9 percent as *animal-specialty*. The largest classification was *general*

[2] Dr. Charles E. Kellogg, Chief of the Division of Soil Survey, to whom I wrote for information about these soils, reports as follows: "The soils of Jasper County are said to have, generally, tight claypans. In our more recent system of classification, these are included with the Planosols. By interpretation from the old map, it seems that around 60 percent of the area consists of Planosols developed under grasslands and around 20 percent of Planosols developed under timber. The remainder of the area consists of wet soils, alluvial soils, etc. In Douglas County, about 56 percent of the soils are included with the Prairie soils quite similar to those of the Morrow plots; about 31 percent are included with the Wiesenboden, wet soils developed under grasses, of which about 15 percent do not underdrain readily and are not very productive: then about 10 percent were developed under timber."

with 49 percent; 20 percent were *poultry* farms, and 9 percent were *self-sufficing*.

It is interesting also to note at this point the strong shift toward soybeans in Douglas county between 1930 and 1940, at the expense of oats and wheat, but also to some extent at the expense of corn. The shift to soybeans in Jasper county was very mild up to 1940—it has been more since. The increase in soybean acreage in Jasper county before 1940 mostly came out of pasture, but some of it came out of hay.

TABLE 3. FARM ORGANIZATIONS IN THE TWO ILLINOIS COUNTIES, 1940

	Douglas		Jasper	
	Acreage of land in different crops		Acreage of land in different crops	
	1940	1930	1940	1930
Corn	57.3	68.8	25.2	21.2
Oats	14.5	34.3	6.4	4.3
Wheat	6.4	15.3	2.4	1.7
Soybeans	51.2	7.5	10.5	2.6
Hay	7.4	9.5	15.3	20.8
Broomcorn	2.7	1.8	0.5	0.3
	Head of Livestock		Head of Livestock	
Horses and mules	3.0	5.2	2.7	3.3
Cattle and calves	9.4	7.8	7.2	5.6
Cows for milk	4.0	3.6	3.5	2.8
Sows and gilts	3.6	3.1	1.7	0.7
Sheep and lambs	2.2	2.0	3.7	4.3
Chickens	85	98	125	132
	Investment—value		Investment—value	
Land	$20,400	$21,200	$2,830	$2,820
Buildings	3,680	4,030	1,210	1,450
Machinery	1,530	1,220	400	330

The average Douglas county farm was valued at seven times the average Jasper county farm—land values reflect net rather than gross product. The data in Table 1 indicate that in 1940 only a third of the Jasper county farms had tractors. This means that considerable of the feed produced is used to supply the farm power. Douglas county farms shifted strongly toward tractors during the thirties. Jasper county farms have been buying tractors more freely in recent years, but can not be expected to go far in this direction as long as their farms remain small.

Surely these two counties can serve to illustrate the difference between "poor" land and "good" land, between "unproductive, uneconomic" land and "productive" land. According to the state-

ment in the report on policy of the committee of the Land Grant College Association, no one should stay on unproductive land "if there are better opportunities elsewhere." Given the "full employment in non-agricultural industry" which this report says is necessary to a prosperous agriculture, at least half of the farm families in the county should be able to obtain much more remunerative jobs in the cities at union wages. After all, the $965 of gross value of products, including products used by the farm household, is only an average. This means that more than half of them were earning less—since all farm income distributions are strongly skewed to the left.[3]

But if the population now on this land should abandon it, what would become of it? It is a good guess that the land would not be abandoned, that the grass which would grow upon it would be grazed or used for hay, and that those using it in this way would in time make farm incomes comparable with those in other grazing areas.

Surely there is a suggestion in this that *what this land mainly needs is a system of land use that is suited to it.* Let's consider this possibility for a space:

First, we might consider simply putting as many acres of land in a Jasper county farm as in a Douglas county farm. If that alone were done, and the necessary additional livestock and equipment provided, and the farm operators were equal to the task of managing this larger enterprise, the $965 of value of product would be raised at least to $1480. Part of them surely would be equal to the task.

But this step would fall far short of equalizing the soil resources used *per operator* in the two counties. If the operators of the Jasper county farms were given as much organic matter to manage as the Douglas county farmers, they would need 410 acres of their kind of land; to have the same amount of nitrogen, 350 acres; of phosphoric acid, 300 acres; of potash, 260 acres; of calcium, 400 acres; of magnesium, 410 acres. A roughly weighted average of these figures is 380 acres. Given soil resources of this amount and the necessary livestock and equipment to go with it, and again assuming the necessary managerial capacity, the $965 would be raised to $3050.

[3] No doubt some of these families had sizable earnings at nonfarm work. This means that they had already partly given up farming.

Such a conclusion, furthermore, assumes farming the 380 acres in the same way that the 120 is now farmed—even continuing to do the work in large part with horses as now. This would mean keeping about eight horses on these farms. Surely tractors would be much more economical. Surely also, given 380 acres, the operator would keep more of his land in hay and pasture, and grow less corn. His gross income would be reduced, but his expenses would also. To be sure, this land is harder to work than the Douglas county land, and there are fewer days when it can be worked. But the main point is that it should not be worked as much; it should be used in ways that require much less plowing and cultivating. Such tillage as is needed can then be done cheaply and expeditiously these days with modern tractor equipment.

But this is not the end of the possibilities. The University of Illinois bulletin on the Jasper county soils outlines systems of management for the dominant soils in the county which involve the use of lime and phosphate and sweet clover to bring up the organic matter, more barnyard manure from the herds of cattle, and furrows and open ditches to carry off the surface water from the nearly level fields, that will even increase the yields of corn and small grains importantly. Unfortunately the bulletin does not say very much about what good soil management will do for hay and pasture, which obviously is strongly indicated for such land. It does say that if barnyard manure is not available in sufficient quantity, potash can be supplied commercially.

More recent research in Illinois and Indiana has shown that those soils are more responsive to heavy fertilizations, especially with potash, than formerly realized. In Indiana, excellent results have been obtained from plowing under the fertilizer or adding it to the plow sole through an attachment on the plow. The fundamental difficulty with these soils for most crops is not so much their fertility as it is their physical structure. Their leached condition can be corrected, but not their structure. Their claypan is only very slightly permeable to water, with the result that the soils are likely to be too wet and soggy part of the time, although the surface will dry out in summer. Since these conditions are unfavorable to the penetration of roots, the roots may find themselves limited to relatively dry soil in the summer. Not only that, their feeding area is much restricted. This is why concentration of heavy fertilization in the whole surface soil gives such a great response. Much of what

used to be called "firing" of the corn, which was laid to drought, is now known to be due to nitrogen deficiency. Thus with heavy fertilization and maintenance of organic matter, including the growing of deep-rooted legumes, these soils are apparently more responsive to management than previously supposed.

Some of the discussion of the problems of this land by soil scientists leaves the writer rather cold. It seems to measure its possibilities in terms of annual crops, even cultivated crops like corn, and of the fertilizer necessary to bring up their yields to satisfactory levels. As Dr. L. J. Norton writes from Illinois, we should be thinking instead of the widespread use of plants that are suited to the conditions found on these soils—of lespedeza as a legume pasture crop, of soybeans instead of corn, and of continuing use of timothy and redtop until the soil is brought into condition to grow sweet clover.

What do all these possibilities add up to? Dr. F. W. Parker of the Bureau of Plant Industry, Soils and Agricultural Engineering who helped select Jasper County for this comparison, has expressed an opinion that if this land is handled as it should be, considerably less than 380 acres will produce as large a net income as now earned on 184 acres of Douglas county land. Before a real judgment could be ventured, one would need to set up budgets of receipts and expenses with units of various sizes, and representing promising alternative systems of farm organization, using the best available, and probably inadequate, input-output data, and then test these data against several years of operations. But whether the prevailing size of the unit should be 200 acres, or 240, or 300, and whether the net income would be $2,000, or $3,000 or $4,000, is beside the point. Any one of these results would substantiate the argument here made that this land is not *unproductive* after all. It is *poor* land in the sense that its product per acre is relatively low. But its product *per man* need not be low. What is mainly wrong in Jasper county is that its land is being *poorly utilized* at present—that is, not being combined with human resources in such a way as to yield a good return to the human agent.

After the foregoing was written, Dr. Norton called attention to a recent study of Cumberland county, which lies between Jasper and Douglas, but which has large expanses of the same claypan soils as Jasper's. The conclusions as to policy reached in this study differ somewhat from those in this article, but that the interpretation of

the facts is very similar, is borne out by the following sentences taken at random from this bulletin.[4]

"Cumberland county has the various kinds of soil and topography which are commonly found in the claypan region. These include prairie and timber soils that are low in productivity and nearly level; rough hilly lands adjacent to streams; and large areas of river-bottom land. . . . Except in the bottomland, the soils of the region are old, mature, silt loams, badly leached and strongly acid. They are usually gray and have developed a claypan within 2 feet or less of the surface on the nearly level areas. (p. 278)

"A relatively high proportion of farms in Cumberland county are small. . . Soils of low productivity of course mean low income per acre; when low productivity is combined with small size, very low incomes result. In 1939, 68 percent of all the farms in Cumberland county produced gross incomes of less than $1,000. (pp. 278–9)

"The hilly area, which has the poorest soils and the most broken topography, also has the smallest farms, averaging 121 acres. In contrast, the most productive areas (river-bottom and dark-gray prairie) have the largest farms, averaging 204 and 210 acres. (p. 291)

"The use made of the crop area appeared to have little relation to the productive capacity of the land. Corn was the outstanding crop in each area, occupying from 38 to 54 per cent of the cropland. (pp. 293–4) . . . Though cropping practices too intensive for the soil were found everywhere in the county, they were most common on farms with a small crop area. (pp. 295–6)

"While a fairly large proportion of the farmers on the largest farms followed good management practices, this proportion diminished rapidly as the farms became smaller. On the small farms, where the best practices are most needed, there was a dearth of good practices." (p. 297)

Social Factors

The origin of the maladjustments in Jasper county becomes a matter of major importance when one sets about determining future policies. The explanation is probably more sociological than economic. Dr. Norton writes that, "No part of these two counties was homesteaded into typical 160-acre tracts. They passed out of

[4] Ross, R. C., V. B. Fielder, and G. H. Walter, *Farming in Cumberland County, in the Claypan Region of Southern Illinois*, Illinois Agri. Exp. Sta. Bull. 506, 1944.

government ownership before the Homestead Act was passed. Jasper County was, I think, settled in small farms by people from Kentucky, southern Indiana and Ohio, including Scotch-Irish, English and German stocks. I suspect the typical tract bought from the Land Office was 80 acres. Farmers with capital definitely did not settle in this area. Douglas County, on the other hand, was included in the Illinois Central lands. The county was swampy and I believe was originally sold in larger tracts than in Jasper County. This swampy character, plus the large capital requirements for drainage, played a large part in determining the present size and tenure pattern of the holdings."

In 1880, the Douglas county farms averaged 130 acres, and the Jasper county farms averaged 117 acres, almost the same as now. The size-groups with the most farms in Douglas county are those centering around 160 acres and 320 acres. In Jasper county they are those centering around 80 acres and 120 acres. One-fourth of the farms in Jasper county are under 50 acres, and only one-eighth of those in Douglas county. At the other end of the range, one-third of those of Douglas county are over 220 acres and only one-eighth of those in Jasper county.

It is also pertinent that 54 percent of the farms in Douglas county are rented and 20 percent are part-owner farms. All told, 71 percent of the land in Douglas county is rented. It thus has tended to pass into the hands of well-to-do persons not on farms. In Jasper county, only 30 percent of the farms are rented and only 50 percent of the land.

Characteristically enough, also only 33 percent of the Jasper county owner-operated farms are mortgaged as compared with 60 percent of those in Douglas county. Cheap farms are less likely to be mortgaged than expensive ones. The average mortgage in Douglas county is nearly five times that of the average mortgage in Jasper county.

In the parts of the United States more west and north, the land was taken up in 160-acre homesteads mostly. These homesteads tended to be split in the early decades after settlement. Homesteads were frequently divided to provide for the sons of those days who wanted to be farmers in their home counties. This process was commonly carried further in the less productive areas than elsewhere, for more farmers' sons have become farmers in low-income than high-income areas in this country—they have received less educa-

tion and fewer of them have become lawyers, doctors, preachers and the like. Not only has there tended to be less migration from the lower-income areas, but the families have tended to be larger. Although Jasper and Douglas counties did not start with 160-acre homesteads, the later stages in their histories have followed the usual pattern.

At any rate, in whatever section of this country one looks around, one *tends* to find the farms smaller on the "poor" land than on the "good" lands. The differences become more pronounced when part of the land was formerly timbered and part not. Clearing 160 acres of timbered land was a big undertaking for one family, and the timbered land usually had less natural fertility than the open-prairie land.[5]

Size of Farms

The authors of the Cumberland County report conclude that one half of the farms in the county now "provide an adequate income," which, however, "could be increased by better management." Another fourth, although they are small and have soils of low productivity, could be made to support a family adequately "if the soil were better managed and better methods of crop and livestock production were used." Only one-fourth are "so small or so unproductive that they never could be made to yield a satisfactory living for a family." (p. 312–3)

The writer has no urge to quarrel with the desire of the folks at Urbana to take care of as many of their present farm families as possible on farms. It seems to be the normal inclination of professors of agriculture as well as of Congressmen. But a few things about such a proposal are a bit disturbing. The first is that the families undertaking to make a better living on the small farms, particularly those in the first fourth named, will be in great danger of trying to do this by putting too much land in corn and soybeans, and of farming too intensively generally. What is envisioned for them apparently is a program of high yields of the crops returning a rela-

[5] There are important exceptions to this general tendency in the South. For example it is pointed out that in the Southeast, the better farms and farmers are often found on the "second-class" soils rather than on the "first-class." The reason is that the most responsive and productive land was taken up first in relatively large holdings, later settlers who wanted to establish homes and had only a small amount of capital were forced to do so on less desirable soils. They have prospered, in many cases, as owner-operators who have looked to the future of their own land; whereas some of the land first taken up has been farmed under a year-to-year tenant system with less efficiency and with practices that have not maintained the soil productivity.

tively large output per acre, and maintaining their land at a high productivity level. If a family has only a small tract of land, and no chance of getting any more, its only way of getting a larger income is to farm more intensively what it has. But it would commonly obtain more income with less effort on additional land.

The second disturbing thought is that of having in such close juxtaposition a group of 1850 farm families operating 153 acres of "poor" land and having gross values of product of perhaps $2,000, allowing very liberally for gains from inproved methods,[6] and in another a group of 1358 families on 184 acres of highly productive land, with values of product of $3530. It is true that these counties have existed side by side with even greater disparities for several generations and no revolution has ensued. But apparently a good many persons have been unhappy about the conditions in counties like Jasper and Cumberland. And now they make some policy recommendations to the effect that the disparity be reduced from $2700 to $1500 by enlarging a fourth of the farms and intensifying the farming on the others. Only a heretic would dare suggest the alternative possibility of intensifying the farming on the more fertile Douglas farms instead—perhaps splitting some of the larger of them into 80's and selling them to tenant purchasers!

The writer holds no brief for 380-acre farms in Jasper county; nor for any size of farms in Douglas county. Perhaps under a proper adjustment of land to human resources over the whole country at some future time, Illinois farms will average smaller than now. Perhaps instead, farm sizes in some other areas will rise to the Douglas county level. The only issue here in question is *relative* size in the two counties. On what basis, other than social expediency, can one propose farms and incomes almost twice as large in one county as in another?

It has been intimated above that efficiency of management may be an important factor in such situations. Most agricultural economists are familiar with the theory that poor land and poor farmers tend to get into combination with each other, and likewise good land and good farmers. The usual explanation of this is that the better farmers are able to obtain enough larger net products from the good land than the less efficient farmers to be able to buy or

[6] If one-fourth of the smallest farms in Jasper county in 1940 had been divided among the others, the average acreage would have been raised from 120 acres to 153 acres. Similarly, if one-fourth of the smallest value-of-products had been distributed among the others, the average would have been raised from $965 to $1370.

rent it away from them. The writer is disposed to accept this theory as valid as far as it goes. But it is a theory that can easily be misapplied. Capacity for management is not fixed and immutable, especially not that of young men on farms. It has been the American experience that the native intelligence of the young people who come out of the low-income rural areas compares rather favorably with that of those who come out of the more prosperous rural areas. The disabilities which limit managerial capacity are mainly cultural and can be overcome.

One would not, however, want to convert all of the present operators of 120-acre farms in Jasper county into managers of 300-acre farms, and certainly not at one simultaneous move. If a program were worked out under which those with the most industry and enterprise were helped to obtain additional land and capital, and at the same time assisted in developing operating plans for these larger units, as is now done with the tenant-purchasers under the Bankhead-Jones Act, within sixty years as much of Jasper county would be in larger economic units as is desirable in any balanced farm organization pattern. Always some fraction of the farms need to be small holdings, part-time farms and the like.

The problem of farm sizes needs to be looked at in larger setting than these two Illinois counties. A few professors of farm management have made such dogmatic statements about the need for larger farms that they have driven many of their contemporaries to the other extreme. Some of the latter of these are likely, after reading the foregoing notes, to rise up and blast the author of them; and insist that until we have tried out giving the people on the mountain and piedmont farms a chance to farm their present land as it should be, we have no basis for urging more land on them.

This is essentially what Congressmen Tarver of Georgia and Doughton of North Carolina said in the House hearings on the agricultural appropriation bill in 1942. One might, for argument's sake, agree that farm land in Georgia, North Carolina, and in the South generally, is more productive per acre than land in Iowa, Minnesota, Wisconsin or Vermont, because of a longer growing season, more rainfall, soils of greater capacity to use fertilizers, or for any other reason that might be advanced. He need have no compunction about agreeing that the productivity of the southern lands could be notably increased by better farming methods! But could he go as far as Judge Tarver would apparently have him go

and say that North Carolina lands are, or could be made to be, 6 times as productive as Iowa lands? 3 times as productive as Wisconsin lands? For Congressman Doughton's Ashe county, the figure would have to be 10 times as productive as Iowa lands. This is what he would have to believe if he expected the North Carolina farm folks to live as well as their northern brethren in these two states. If these comparisons are expressed in terms of farm workers as reported in the 1940 census, the North Carolina-Iowa figure is still about 7 to 1; and the Wisconsin comparison falls to 2 or 3. The mountain county of Knott, Kentucky, stands at about the extreme position for the South. Following are the data that support these statements:

	Per 100 acres of cropland[a]			
	Rural farm persons		Farm workers	
North Carolina	26.7		7.7	
Ashe County		45.9		11.8
Alabama	18.0		5.4	
Marion County		22.2		7.1
Kentucky	23.3		6.3	
Knott County		75.1		16.8
Iowa	4.5		1.7	
Hamilton County		3.7		1.3
Wisconsin	8.8		3.3	
Dodge County		6.5		2.5
Vermont	10.2		3.6	
Addison County		7.0		2.4

[a] Acres harvested plus acres of crop failure.

If the comparison is put on the basis of pasture land plus crop land, it changes considerably the figures for Kentucky with its large expanse of bluegrass pasture, and reduces the extremes of the difference for North Carolina. But it does not change the picture importantly. The simple fact is that the best methods the TVA or anybody else has developed cannot make farm incomes adequate on at least a third of the full-time farms in this country. They may keep the old folks on their present farms while they live; but their boys and girls will run out on them if we can have reasonably good urban employment in the next few decades. Their decadent farms will either revert to brush and timber or be absorbed in other farms. *The latter is frequently to be preferred; and this absorption should begin before all the young people have left for the city, while it is still possible to put together good combinations of land and farm operators.*

Those who propose making these small farms more productive need to consider still another aspect of the matter. Efficient intensive management of a 60-acre farm in southern Wisconsin, or in the Champlain Valley of Vermont, will yield as good a return as rough-and-ready extensive management of twice that acreage. The 60-acre farm will operate at a considerably higher fertility level than the 120-acre farm—it will have more operating capital invested currently per acre. If all dairy farms shifted to this intensive system, however, the market for dairy products would be glutted; as the shift in this direction developed in fluid milk areas, so much milk would be sold at Class 2 prices that the blended price would fall and the shift would be halted. The consequence of this is that some of the farmers operate at one level of intensity and some at another, and balance between them keeps the supply of milk at a level that equates with demand at prices that keep a certain quota of workers on the land.

In this way the farmers that have a predilection for a small acreage intensively farmed can satisfy their urge. Or whole counties may be saved by being brought within a milkshed around a growing city. But it is not possible, even where the farming lends itself to such intensification, to apply it to all the farms *until the demand for farm products increases markedly.* The problem of increasing the income of general farms in the TVA region, for example, cannot for this reason be solved by intensifying all the farming in this region. If part of them intensify, others must extensify. In the "surplus" condition likely to confront the agriculture of this country in 1948 and after, it will be particularly necessary for many of them to extensify.

Extensive farming, however, can still be good farming. It can be just as good farming as the intensive kind. It ordinarily means keeping more land in pasture and less in crops, more in hay and small grains and less in row crops. It may also mean keeping more beef cattle and hogs and fewer dairy cows and hens. Nearly all of these changes are good for the land. In the South, it will certainly mean growing less cotton and tobacco. To obtain an adequate income from these more extensive systems of management, more acres will be needed per farm.

The considerable shift toward more use of power and machines that is generally expected after the war is certain to have the same general effect as described. It will sometimes mean larger outputs

per farm, it is true, because the land will be more thoroughly worked in the technical sense. But the acreages will surely expand. If the mechanization of cotton growing and harvesting reduces man labor to a fourth or a fifth of present levels, as reported by Secretary Wickard in the recent hearings before the Pace Committee, it will force radical changes in due time on the cotton areas not lending themselves to it readily.

The farm-size pattern of the future will be still more varied than now. We shall see more part-time and residential farms. The family-sized farms will be generally mechanized and contain more acres than now. But some will use motorized equipment of the smaller sorts now being developed, to farm relatively small acreages intensively. Probably, also, we shall see more farms using highly-powered equipment on acreages larger than we will be inclined to call family-sized farms. The rate at which this size pattern will develop is mainly dependent on the levels of urban employment and of demand for farm products.

Submarginal Land

The foregoing analysis raises the question as to whether there is such a thing as "unproductive" land. It is hard to find an acre of land that does not yield some kind of a product. But does it yield a *net* product? you may ask. The answer is "Yes," providing it is properly used. If net losses result, the land is nearly always being misused.

Is there, then, such a thing as *submarginal* land? that is, land that does not pay back what is put into it? The answer again is "No," in all but very exceptional cases.[7] But there is much *submarginal use* of land. Jasper county land would prove to be submarginally used if one insisted on growing mostly corn and winter wheat on it; or on farming so few acres of it that the net income per acre multiplied by the number of acres failed to provide a decent livelihood. But Douglas county land could be submarginally used too.

As the store of natural fertility in a soil diminishes, or structure

[7] The very exceptional cases are lands like those in the Mohave Desert, or in the Great Salt Lake Desert, that must have highways and railways built across them because they stand in the way. No doubt, also, the expense of building highways and railways across some mountains is not fully offset by the several contributions of these to society, including scenic and recreational values, game, timber, and often most important of all, as collectors and reservoirs of water and snow for water-powers, irrigation and stream-flow generally. Some lands that would be submarginal in private use are not so in public use.

or drainage become poorer, or rainfall declines, or growing season shortens, the amount of product that will come forth from an acre of land declines. The inputs of labor and capital need to be proportioned to these other inputs. So long as the proportioning is properly done, no net losses result, and nothing is submarginal. These relationships are clearly seen as one crosses the country from the Mississippi River westward, with rainfall declining from 35 inches to 5 or less in a few almost desert sections. At the eastern end of this range, systems of farming can be practised that keep a large percentage of the land in cultivated crops. As the rainfall declines, wheat replaces the corn increasingly. Then come areas in which persistence in wheat growing will make the farming appear to be sub-marginal, and finally areas in which not even cattle and sheep raising can survive and hunting is the only possible form of land use.

Ordinarily no sharp break appears between two different uses of land. Farming in which corn is more important than wheat in eastern Nebraska gradually changes into farming in which wheat is more important than corn. Similarly, farther west, wheat farming gradually changes to ranching. Intensity of land use thus appears as a continuum rather than as a series of discrete steps.[8]

It is therefore entirely proper to speak of land as having a low productivity, per acre, or per man unit. Land can even be spoken of as in different *grades* according to its level of productivity. But little if any land in this country is completely unproductive. The most nearly unproductive land the writer found in forty thousand miles of automobile travel in 1941 was still supporting a few jackrabbits and might even have supported cattle if the jackrabbits could all have been killed off.

In this connection, the terms *intensive margin* and *extensive margin* are often used in such a way as to create confusion. Really these are not two margins, but two ways of looking at the same margin. When the approach is from the standpoint of the last unit of input that just pays for itself on a given type of land, we speak of the intensive margin. In the east-to-west continuum with declining rainfall, there is always a grade of land just a little lower that will

[8] Sharp breaks sometimes occur due to major changes in soil types. Such a break occurs as one passes out of the Podzol timber soils of northwest Minnesota into the Chernozem soils of the Red River Valley; or into the Sandhill grazing area of north central Nebraska; or from a hill slope to alluvial bottom land even on a single farm.

not use quite so much labor and capital without incurring a net loss. At the exact point where this begins, is the extensive margin when using *this amount of labor and capital.* Or given this particular piece of land, there is always a slightly larger input of labor and capital which will not quite pay for itself. At the exact point where this begins, is the intensive margin for this particular land.

Submarginality in *use* of land is not easy to determine for family farming types of agriculture, for it is not easy to say when the last unit of family and proprietor labor and management has just paid for itself. About the only basis upon which a value can be set upon such labor and management is according to the alternative-use value or opportunity-cost principle, and such values are difficult to establish. According to one application of this principle, the alternative-use value is what the farmer could earn at some other employment that is really open to him and that he would choose if he knew about it and was free to shift to it. In practice, however, the families living in low-income areas are often not free to change to other occupations, or they can do so only at great sacrifice. Hence they may not have any other real alternatives. This application of the principle of opportunity cost may therefore leave us with very little really sub-marginal *land use.*

A more constructive application of the principle, particularly in land-use planning, is to look ahead and see what alternative employments the next generation coming along in the area might seek and prepare itself for, and how the prospective incomes compare with those possible from farming in the area under various systems of farm organization. If the principle could be applied in this way, many of the present uses of land in the United States would prove to be submarginal, even after full allowance was made for the advantages of obtaining part of one's living from the farm directly, and after weighing all the advantages and disadvantages that go with living on farms as compared with living in cities.

Still another way of testing for sub-marginality may safeguard us from the error of consigning certain low-income areas to perdition. Perhaps the best way to explain it is to refer to the familiar boner of the restaurant operator who said he lost a little money on each meal he served, but made up for it by serving a large number of meals. If any farmer on any piece of land can increase his net income by farming more of it, he must have some margin of net revenue on what he is now farming.

When in 1933 and afterward, L. C. Gray, H. R. Tolley and others were trying to develop a land program for this country, they carefully refrained from designating any areas as submarginal. Instead, they talked about "problem areas." They assumed that every piece of land has a best use, and conceived their task as finding out what this use was. More often than not, it was some other agricultural way of using the land. In other cases, it was a combination of crops and grazing, or of crops and forestry, etc. They were looking for readjustments that needed to be made and not for opportunities to "abandon" land.

Quality in Land

Let us now go back to the statement earlier in the article that the tendency is to grade land as poor to excellent solely on the basis of the supply of chemical plant nutrients contained in it. The soils professors have been telling us for twenty-five years or more that soils are much more than their chemical contents. But the minds of some of them still seem to run at times in the old grooves set by Justus Von Liebig. Modern soil science, while denying none of the facts established by Liebig, teaches that the balance-sheet theory of soil fertility is not even approximately true.[9] Apparently it is one thing to teach the newer soil science in the classroom and something very different to apply it in the analysis of practical problems. Once a particular soils situation confronts a working soil chemist, his mind still tends to slip back into the grooves established in the minds of an older generation.

This is not surprising. There is the same cultural lag in economics—the same gap between modern economic science and current practice. It is getting on toward a full century since the Austrian economists introduced the approach to value from the want side as distinguished from cost side, but a large fraction of the working economists when confronted by an actual problem find themselves thinking in terms of the concepts of Ricardo and John Stuart Mill. Only recently has the United States Supreme Court showed signs of breaking away from Mill's system of thought in the application of the theory of value to public utility rates. Dr. J. R. Commons in his *Legal Foundations of Capitalism*, which is a study of public valuation by the courts, almost accepts Mill's value theory as a valid

[9] For a non-technical discussion of the old and new theories, *see* Kellogg, Charles E., *The Soils That Support Us*. Macmillan. 1941. See especially pages 6–14 and 225–228 regarding the balance sheet theory.

basis for a legal theory of value, and some of Dr. Common's disciples are still saying that Ricardo and Mill were mostly right after all.

Which soil is the more productive, a black *Prairie* soil which yields 45 bushels of corn per acre with only small applications of fertilizer per acre, larger ones not seeming to help any, or a *Gray Brown Podzolic* soil that yields 70 bushels with large applications of fertilizer? The *capacity* of the soil to convert fertilizer supplements into product may be as important as the natural supplies of plant nutrients. The capacity of soils to use fertilizer productively depends upon texture, drainage, climate and other factors. The famous Caribou silt loams of Aroostook County, Maine, will produce 100 bushels of potatoes per acre for a short span of years with no commercial fertilizer; but with just the right amount of liming, clover plowed under to produce humus, and an application of one ton of 5-8-7 fertilizer, costing $50, they will yield 375 bushels of potatoes per acre, of which 90 percent will grade U. S. No. 1.

The soils of Seabrooke farms of New Jersey, being managed by Dr. Frank App, furnish an even more striking illustration. In discussing these soils before the International Management Congress in 1938, Dr. App spoke of them as being light sandy loams, almost pine barren soils, in fact; and yet he argued that they might be able to out-compete much of the truck land of the southern states in the production of canning crops. The late Dean Lipman of New Jersey, who was present at this session, said that New Jersey had at least two million acres of land that was as well suited to growing these canning crops as that on Seabrooke farms. Location with respect to markets is a factor in the success of Seabrooke farms, but more important is texture, drainage, climate, rainfall, and of course skilled management.

The exemplification of the principle which probably is most important in the national economy is furnished by the Norfolk fine sandy loam of the Southeast Coastal Plain. Although this soil is low in plant nutrients under natural conditions, it is extremely responsive to management. In consequence, it is one of the best soils of the nation from an overall agricultural standpoint. Its low natural supply of nutrients is of little significance. Much more important is its adequate rainfall, sunshine, and long growing season, and the fact that it is very easy to maintain a good structure in its surface horizons for nearly all plants. Water enters the soil easily,

and while the lower soil holds a good supply between rains, it allows the excess to drain away. With the use of lime and fertilizers, and manures, green manures and cover crops to maintain organic matter, large yields of many crops are obtained at relatively low cost because the soil is so easy to handle. One might compare this soil with the Iredell soils in the same region. These have a higher content of plant nutrients under natural conditions, but they have a poor structure and are exceedingly difficult to manage even on gentle slopes. Chemical analyses could certainly mislead as to the relative value of these two soils for use by farmers.

As an example of the same thing under western conditions may be cited the soils in western North Dakota where the local soil types vary a good deal in their productivity for wheat under current practices. Nutrient supply has little relevance here also, the important factors being the soil characteristics which influence the entrance of water into the soil, its retention, and its delivery to plants when they need it.

It follows that the productivity of soils cannot be predicted from one or even two variables, even if one of these is plant nutrients in the soil. Soils vary so much from one another in all their characteristics that these must be considered *as a whole* in each case. The relation of nutrient content, of pH, of slope, of texture, of structure, or of any other characteristic, to yield and to response to management *depends upon the other factors in the combination*. The relationship between content of plant nutrients and yield, like that between slope and erosion hazard, between texture and workability, and between texture and water-holding capacity, or any other set of variables, is only *net* after the other variables are held constant. And of course it is extremely difficult to do this statistically. Given two otherwise *similar* combinations of soil characteristics, the influence of variations in plant nutrients, and so on can be determined. But such setups are mostly found only under the artificial conditions created on fertilizer plots.

Another difficulty is that most of the chemical data used by agronomists and soil chemists concern simply the surface soil. Whether or not a soil will respond to lime depends upon a lot of things besides the pH of the surface soil.

The most egregious instance of the type of error warned against in the foregoing is the recent attempt of a group of soil chemists and agronomists to determine the economic significance of the contribu-

tion of commercial plant nutrients to agricultural production. This group has discovered that commercial fertilizer is responsible for 20 percent of the agricultural product of Ohio, Indiana and California, 25 percent of that of all New England, 65 percent of that of Rhode Island, 60 percent of that of North and South Carolina and New Jersey, and 83 percent of that of Florida. The 65 percent, for example, for Rhode Island means only 35 percent for all the labor and management of the farms of the state, all the investment in buildings, machinery and livestock, and all the seed and other supplies, including *a purchased feed bill which is nine times larger than the fertilizer bill.* Dr. Charles J. Brand, Executive Secretary of the National Fertilizer Association, in attempting to defend these results, has remarked as follows: "I believe most informed people, for example, in Florida, would say that on most of their soils practically no *marketable* fruits or vegetables could be produced without fertilizer. Our estimate for Florida was 83 percent dependence on fertilizers."

Would it seem a bit unreasonable to suggest to Dr. Brand that he mix up a batch of nitrate, phosphate and potash, add whatever lime and magnesium he wishes, and traces of iron, copper, etc., stir it up with just the right amount of water and spread it out as a thick layer on the prairies of North Dakota, and plant orange trees and see what yield he gets. Dr. Brand might well reply: "But North Dakota doesn't have the climate and rainfall for oranges." True, neither has it the particular structure, texture, etc., of soils that go with Florida climate and rainfall. It is the particular *combination* of all these factors and some others that makes orange growing successful in Florida, and establishes the value of the land on which oranges are grown. This particular combination is not repeated *ad libitum* in the world, any more than the particular combination that has made Chicago the second city in the United States.

When the Soil Survey began some twelve years ago to make ratings of soil types in order to express their productivity for crops, an attempt was made to express *inherent* productivity. This was supposed to represent the yield of crops from the soil with the natural supply of plant nutrients when the soil had passed through a very short early period of unusual tilth before the natural supply of plant nutrients and organic matter was exhausted. It also made a rating under *current practice,* which was defined in each case as

well as possible in physical terms according to the management practices followed by the majority of successful farmers, which was generally better than average but well below the best.[10] The Soil Survey has since found the concept of *inherent* productivity difficult if not impossible to apply, and seems to be abandoning it largely. The Soil Survey now gives productivity ratings for soil types under stated management practices.[11] In fact, it insists that "soil productivity is a matter of response to management and must be measured in yields and quality only under a specified management."[12] Thus a soil like the Norfolk fine sandy loam, mentioned earlier, would receive a very low rating under a system of management that did not include lime, fertilizers, manure, or green manures, but a high rating under a system that did include these practices.

The recent releases of the Soil Survey give productivity ratings for soil types under several physically defined systems of management wherever adequate data can be assembled. The translation of these ratings into economic terms must take account of predicted costs, prices, land values, and so on. Some of the ratings are given in terms of percentage of a standard, and some directly in terms of bushels. Of course, either can be calculated from the other. In using them in farm planning, one needs to know the yields, but in making comparisons between soils growing different crops, the ratings in percentage are useful. General ratings made by weighting those for the individual crops, are not entirely satisfactory.

It is thus apparent that much confusion can be introduced by thinking of the productivity of soils in terms largely confined to the chemical nutrients they contain, or which are added through commercial fertilizers. When to this confusion is added that arising from measuring productivity generally per acre rather than per man, we are in danger of going astray in working out plans for land use.

Intensity of Use

Several of the soils named would be rated low in any scoring system based on chemical contents of the soil. They might even be rated *poor* in the popular classification of soils as excellent, good,

[10] *Soils and Men*, pp. 1011–15.

[11] *See* Ableiter, J. K., "Productivity ratings of soil types," pp. 13–24 in *The classification of land*, Bull. 421. Missouri Agr. Expt. Sta., 1940.

[12] Kellogg, Charles E., *The Soils That Support Us*, p. 261.

fair and poor. Yet both of them are used with a high degree of intensity.

This leads to the remark that earlier analysis in this article may have carried the implication that the adjustments needed on low-grade soils are generally toward less intensity. This was not intended. Often, less labor intensity is required, but this is made up for by more capital intensity. The total product resulting may be either more or less. If grazing is substituted for crops, the product is less; likewise if small grain is substituted for row crops or cotton. When, however, pastures are improved by the application of lime and phosphate, or by restocking with better grasses and legumes, or by contour ridging, the output is increased. Likewise is it increased when more fertilizer is applied or the land is given better tilth.

The kind of land improvement that much land not now submarginally used requires is pretty certain to result in larger yields. No doubt the reason for the present low incomes in many areas is that the land has not been improved enough. Just as arid land becomes highly productive when water is applied to it, so may other types of land when certain essential elements are provided.

Probably most of the forest land of the country now submarginally used—at least, private enterprise is not willing to take it over—is in this state because it is not being intensively enough managed.

This is illustrated—but of course not proved—by an analysis of woodland management in Worcester County, Massachusetts. One of the forest farms analyzed may serve as an example. It consists of 350 acres of land mostly in some kind of tree or brush covering. Incomes were estimated for it by five-year periods up to eighty years for two scales of farming operation and five different intensities of forest management. One scale of farming operation involved keeping four milk cows and providing pasture, hay and forage for these and for the three horses used on the farm and woodland work, as well as other food for the farm family. The other involved producing food only for the farm family (one cow, etc.) and hay for the horses. The combination which promised the largest returns over the whole period included the four cows, "full" treatment on 14 of the stands, and "partial" treatment on 10 of them. The full treatment involves doing all the thinning and improvement cutting required for good silviculture at any period, and handling the cutting in such a way as to come out in the end with all age classes

represented by even-aged stands. The partial treatment calls for one weeding when any stand is about 15 years old, a combined thinning and improvement-cutting operation at around 30 to 40 years, a thinning around 55 to 65 years, and a final cutting around 80 years. Full treatment did not promise to pay out on the 10 poorer sites. On the other hand, applying only partial treatment to the 14 better stands would reduce the net income greatly and leave the operator with some spare time. *With either no treatment at all, or with a cordwood system of cropping, this forest-farm would not be able to support the operator and his family.* The combination with the four cows promised to pay better than that with only one, because, first, some of the land on this holding grows good pasture, hay and other forage, and returns considerably more per acre so used than in timber, and second, the operator can fit in the labor needed for this much farming without its interfering with his work in the woods.

Application by Areas

The meaning of the foregoing analysis varies greatly for different sections of the country. The Jasper county situation is only one among many hundreds in the country, each with its own particular complexion. Consider, for example, the Mississippi Delta territory. The ordinary cropper on these inherently high-productive lands has a very small income. Subtract from his gross sales his out-of-pocket costs for seed, mule feed, ginning, sprays and the like, and divide the net proceeds by the number of hours of labor which he and his family spends in growing and picking the cotton, and the quotient, in the years preceding the war, was around ten to fifteen cents per hour. The Delta cropper spent an average of 150 hours per acre of cotton in those years. We are now being told that with full mechanization, including the use of mechanical cotton pickers, the labor input can be reduced to 30 hours per acre. This will make it possible for one worker to handle five times as many acres as before. Other crops that can be combined with cotton can also be mechanized. Although this land is obviously not poor, those who grew the prewar cotton had submarginal incomes.

Incomes were of course even lower on comparable farms in the Piedmont areas of the South. Cotton is likely to be much more difficult to mechanize in these areas because the fields are small and irregular. Furthermore, the Piedmont soils require heavy applica-

tions of commercial fertilizer. A system of land use seems to be called for that is in the nature of general farming, the mainstay of which is forage production for livestock, with cotton as a supplementary cash enterprise. Unless something of this kind takes place, all of the small farmers depending upon cotton in the Piedmont areas will be forced out in due time. The uses of the land will be much more submarginal than they are now. General farming, however, should be able to persist in competition with general farming in other regions.

Merely shifting to *general* farming is not enough. In the *general farming* parts of Tennessee, farm incomes are only a little better than in the Piedmont cotton sections. There is not enough productivity within the usual farm boundary.

The Rendzina soils of the Black Belt of Alabama and Mississippi present another type of situation. The black topsoil layer overlying the lime, not very thick in the first place on much of it, has been worn so thin by two centuries of continuous cropping that cotton can no longer be grown successfully. Also the cotton matures late on these soils and perhaps suffers more from the boll weevil than cotton on warmer soils. The plants also suffer a little more from drought in periods of combined drought and heat. The land lends itself to large-scale mechanical treatment, but more than this is required. Types of soil management must be developed that will gradually restore the humus in these soils. The Alabama Experiment Station seems to be making good progress in devising systems of management including hay and pasture to be fed to cattle.

The northern cut-over lands of the Great Lakes states are commonly rated as mostly poor and unproductive. As a matter of fact, they include a good many stretches now in poor timber that would make good crop land. Enough good plow land is intermingled with the rough stony and sandy land so that much of it can be organized into successful operating units combining crop growing with dairying and forestry. In some areas, these units would derive their income more largely from dairy production and such crops as potatoes. In others, the timber would provide the major source of income. The units need to be larger, however, than most of those now found in the region, to make more use of power and machinery, and especially to develop less labor-consuming types of silviculture.

The so-called abandoned lands of the Northeast offer still another example. Very little of this land is in fact abandoned. Almost al-

ways someone is willing to retain title to it and pay the taxes. The Great Lake states have much more abandoned or tax-delinquent land than has the Northeast. But it is true that farming has been given up on a large amount of land in the Northeast. It has gradually retreated down the mountain slopes toward the valleys until today none is left in many sections except in the valleys and "intervales."

Professor F. F. Hill says that recent farm management surveys in New York show that the hill farms are still disappearing. This is likely to continue as long as present systems of land use continue. The usual operating unit on these hill lands provides only a substandard family living. But we need not conclude from this that no other future is possible for these areas. What a vigorous program of land-use adjustment would do for these areas has not been determined. Farm forestry and forest farming units will not develop without considerable public assistance of one form or another. Neither will the farmers now on these lands restore their pastures and meadows to full productivity without a good deal of help.

Measures

We have heard much discussion in the last ten years of the need for readjustment of land use in the low-income areas, but very little has actually been accomplished. Instead, in New York state some public funds have been made available to buy up these lands and put them into state forests, and in Wisconsin a program has been developed for zoning such lands out of agricultural use. Probably most of the lands thus far purchased or zoned out will produce more in straight forest use than in any other way, but we can not be sure of this. For some of them, a combined agricultural and forest use might prove to be better if only we knew enough about this kind of farming. Probably as one step in this direction, each state should establish a number of "pilot farms" in which agriculture and forestry are combined into various patterns. Data on actual returns from different combinations will be delayed because of the period required to mature a crop of trees. But data on growth rates by species and sites enable one to make fairly accurate forecasts of volume of timber output. Prices will have to be more or less conjectural.

Few of the present undertakings along these lines measure up to

needs. The Norris-Doxey farms and woodlands are not carefully enough replanned in most cases to serve as real test demonstration units. Most of the test demonstration farms of the TVA are not replanned drastically enough to serve such a need. They were intended to serve a more limited purpose. Possibly the nearest approach to what is required are the several "unit farms" that have been organized by the Alabama Experiment Station. The writer visited one of these in the Black Belt in 1941. Professor Harry Woodworth's article contains the best discussion of the possibilities of such pilot farms.[13]

Doubtless, however, we will not be able to wait for the results of such testing before having to proceed in many problem areas. Instead, we shall have to make the best of what knowledge we now have, and learn by trial and error on a larger scale.

In order to make the adjustments required in many problem areas, many farmers will need credit to purchase the additional land needed or to improve some of their land, and to secure the necessary additions to their livestock and equipment. Loans for such purposes can be obtained from the Farm Credit Administration, but only within rather rigorous limits. Many of the mortgages now being written by the Federal Land Banks are for the purchase of additional land, but ordinarily these are not to obtain larger acreages in low-income areas. They are more likely, instead, to help some farmer already with a sizable holding to obtain enough more land so that he can use large-scale equipment more efficiently. Credit for younger families showing promise, with some guidance in planning the reorganizations such as the Bankhead-Jones borrowers now receive, should induce a good deal of improvement in most areas in twenty years.

The farms being set up under the Bankhead-Jones program of the Farm Security Administration are usually economic units meeting the conditions outlined in this article, but too few of these are available in the low-income areas to be of any particular help. Professor H. C. M. Case, however, insists that too often they have not been economic units on the claypan soils of Illinois.

The program that gets nearest to dealing with this problem is the land utilization program of the Soil Conservation Service, the pro-

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[13] *Farm Management Research Needs in New England*, this JOURNAL, August 1944.

gram which the SCS inherited from the Resettlement Administration when it was reorganized. This is a program for buying run-down tracts of land, rehabilitating and reorganizing them into economic units, and then leasing them back into private ownership. Apparently, this program is conceived at present, like the Wisconsin and New York programs, mainly as a program for taking land out of regular farm use and getting it into special uses, such as timber, grazing or meadow. Where shift of land largely from one major use-class to another is needed—and situations of this sort are not hard to find—such procedures are indicated. But in the more usual situation in this country, the land needs to be handled in farm units, or farm-forestry or forest-farming units, and the intent should be resale rather than leasing, and as promptly as economic units can be established.

This program is very small at present, and keeping itself well under cover. So much opposition has been stirred up in recent years to public ownership of land that it is doubtful if it should be urged at present even as a step toward its reconversion or reorganization. Let the Soil Conservation Service now demonstrate what it can do with the tracts it has, and in particular that it can transfer some of them back into private ownership.

THE MARGINAL FEED COST OF PORK AND LARD*

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CHANGES in the number and in the marketing weight of hogs have held a high place in agricultural planning during the current war period. In 1941–42, interest centered in increasing both numbers and weights in order to convert the seemingly tremendous stocks of feed into meat and lard. By 1943–44 an impending feed shortage made imperative a reduction in numbers and weights, but the danger of a shortage was averted in 1944 when reduction in livestock coincided with a record feed crop.

Hogs consume more feed grains than any other class of livestock, and they are important sources for both meat and fat. The use of limited feed resources to secure the greatest food production requires that choices be made between hogs and other classes of livestock including poultry, and between fat hogs and alternative sources of fat.

To make these decisions wisely we should know the feed required to produce pork and lard and particularly the effect of shifts in marketing weight upon the relationship between feed consumption and pork and lard production. Since pork and lard are both obtained from hogs of all weights, it is impossible to figure the average feed costs of each separately; i.e., pork and lard are "joint products" in the sense that they are both produced together. They are not produced in fixed proportions, however, for by changes in marketing weight the proportion of pork to lard can be varied. This makes possible the determination of the relationship between feed consumption and pork production independent of changes in lard output and of the feed-lard relationship with pork output unaffected. These relationships, which may be called the marginal feed costs of pork and of lard, are critical ones to consider in deciding on any shift in marketing weight of hogs or any allocations of

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* This manuscript was taken from a thesis submitted to the faculty of the graduate college, Iowa State College, in partial fulfillment of the requirements for the degree, Doctor of Philosophy. The work reported on was carried out under a Bureau of Agricultural Economics project organized to study input-output relationships in farming.

The writer is indebted to R. G. Bressler Jr. and C. H. W. Sedgewick of the University of Connecticut for help with the equations used. R. L. Mighell and J. W. Klein of the Bureau of Agricultural Economics made helpful suggestions.

feed between hogs and other livestock. The purpose of this paper is to develop these marginal feed costs under certain simplifying assumptions.

Three sets of basic data are used in the determination of the feed cost of pork and lard production.

I. Feed-after-weaning is based on 12 experiments in the 5 Corn Belt States involving 800 hogs full-fed a balanced ration with corn as the basal feed in dry lot.[1]

II. The feed and gain of the breeding herd is based on market statistics of the BAE and farm-cost studies, chiefly unpublished results, based on records of 10,000 sows.[2]

III. The composition of the hog is based on a recent report of slaughter tests of 64 intermediate type hogs.[3]

The relationship between feed consumption and live weight gain is treated in detail in another report[1] which deals with the problem of the most profitable marketing weight for the farmer. The feed-gain figures are presented here only in summary form in connection with the composition of the hog to show the relationship between feed consumption and pork and lard output. It is necessary, however, to consider the composition of the hog in some detail.

Standardized Pork and Residual Fat

The composition of the carcass offers a special problem in comparing hogs of different weights. Packers ordinarily obtain no higher percentage lard yields from heavy hogs than from light ones, even though the heavy hogs are much fatter. Some fat cuts, such as plates and backs, are usually rendered into lard in the case of light hogs because they are too thin to make acceptable cuts. Such cuts, which absorb a large portion of the added fat of the mature hog, are normally made into pork cuts in the case of heavy hogs, and thus increase the pork yield at the expense of the lard yield. Thus the pork from a heavy hog contains more fat and less

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[1] Atkinson, L. Jay and John W. Klein. "Feed Consumption and Marketing Weight of Hogs." Manuscript submitted for publication as USDA bulletin.

[2] Steanson, Oscar. "The Economics of Corn Belt Hog Production." Unpublished manuscript, BAE.

[3] Ellis, N. R. 1943. "The Chemical Composition and Nutritive Value of the Dressed Carcass and Cuts in Relation to Live Weight of the Hog of Intermediate Type." A.H.D. No. 67, BAI, USDA mimeo.

Hankins, O. G. and Hiner, R. L. 1943. "The Physical Composition of the Dressed Carcass and Cuts in Relation to Live Weight of the Hog of Intermediate Type." BAI, USDA mimeo.

protein and is not comparable nutritionally with meat from lighter hogs. In order to make them more comparable, use is made here of the concept of "standardized" pork[4] which is pork of a given composition (chemical). It is obtained by trimming the fatter cuts that come from the heavier hogs more closely than the leaner cuts that come from the lighter hogs in order that the cuts be of approximately standard composition, regardless of the slaughter weight of the hog.[5]

On the basis of the chemical and physical composition the chemical content of pork cuts from hogs that weigh from 175 to 275 pounds can be approximately standardized by trimming the fat on each cut more or less closely, as needed.[6] The result is pork of a given composition from hogs of various weights, which is termed "standardized pork." The remaining fat trimmings are figured on the basis of their fat content, i.e., a rendered basis, and are called "residual fat, lard equivalent."

Standardized pork and residual fat are based upon the edible portion of the carcass; they differ from the dressed carcass by including edible offal but excluding bone and skin. The standardized pork and residual fat from a hog weighing 225 pounds will weigh about 80 percent as much as the dressed carcass. The 13 percent protein and 42 percent fat in the standardized pork are about the same as Chatfield and Adams' figures on the proximate composition of the edible portion of medium carcasses. In other words, 1 pound of standardized pork is equal to 1 pound of the edible meat (excluding skin and bone) from a medium carcass, and is equal to 1.1 pounds of meat as purchased at the store.[7]

While it is assumed that each cut is handled in a standard way, the validity of standardized pork as a measure of the nutritional value of pork and lard does not depend upon a carcass actually being cut in the prescribed manner. If e.g., clear plates are more valuable as a pork cut than if they are rendered into lard, the evaluation of the edible protein and edible fat in these cuts is valid even though it is not rendered. One result of this calculation is that the

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[4] Developed by John W. Klein, BAE, on military leave.

[5] This is possible (though not necessarily desirable) because the hog reaches what is known as chemical maturity at about 150–175 pounds at which weight the composition on a fat-free basis becomes stabilized. Ill. Agr. Expt. Sta. Bul. 323, p. 589.

[6] Based on the chemical and physical tests of composition by the BAI., op. cit.

[7] Except for a slight adjustment to include edible offal. "Proximate Composition of American Food Materials," USDA Circ. No. 549, 1940.

"residual fat, lard equivalent" overstates the visible fat production; but since fat cuts are used in part for the same purposes (e.g. seasoning) as visible fat, the failure to qualify as a visible fat may not be serious so far as the fat supply is concerned. This failure appears as a problem only in the artificial classification of fats which includes only the visible supply. From a nutritional standpoint, plates and backs are of about the same value as pork cuts or

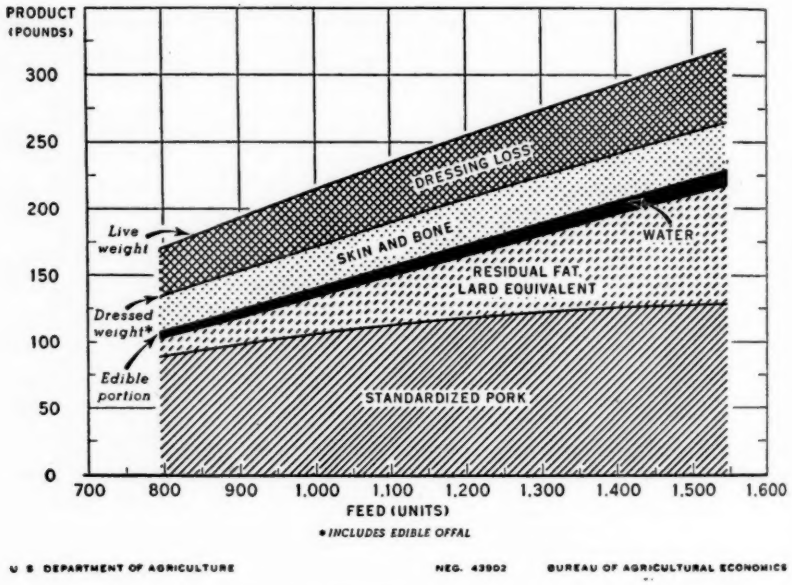

FIG. 1. OUTPUT AS RELATED TO INPUT, PER HOG BASIS

As the marketing weight increases, dressed weight rises relative to live weight, and the edible portion of the carcass increases more than the inedible (skin and bone). Thus, the largest output of live weight per feed unit is at about 175 pounds, the peak output of dressed carcass per feed unit is at 250 pounds, while the total output of edible product rises at a more rapid rate than total feed consumption throughout the range of the data.

as lard and cracklings, except for any difference in waste. Similarly standardized pork and residual fat are nutritionally valid for measuring the other cuts from hogs of various weights even though this method of cutting is not followed.[8]

In comparing hogs of different weights complete standardization is assumed, even though only an approximation is feasible in prac-

[8] It will not, of course, reflect consumers' preferences for particular size cuts.

tice. Care is taken that the edible fat and edible protein are accurately reflected in the extensive use of the concept of standardized pork that is made here. The use of this concept is based on the belief that this is the most appropriate measure available for comparing hogs of different weights.

Input-Output—General Relationships

As the marketing weight of the hog increases, standardized pork increases at a less rapid rate (than weight) while residual fat increases more rapidly (fig. 1). The water shown in figure 1 is that obtained when rendering the fat. The skin and bone make up the rest of the dressed carcass. The dressing loss then, is the difference betwen carcass and live weight.[9]

As hogs are fed to heavier weights, the relationship between feed[10] and output measured in various ways is as follows:

(1) Live weight increases but at a slowly declining rate above 175 pounds weight of the butcher hog.
(2) Dressed carcass including edible offal increases at a more rapid rate than feed until a weight of about 250 pounds is reached, and thereafter at a less rapid rate.
(3) The edible portion of the hog increases at a more rapid rate than feed throughout the range shown. As the weight of the hog increases an increasing percentage of the edible portion consists of residual fat, while standardized pork makes up a smaller percentage although it continues to increase in absolute terms.

Alternative Outputs of Pork and Fat from a Fixed Feed Supply

An approach to the marginal feed cost of the production of pork and fat may be made by ascertaining the shifts in each that can be made from any given feed supply for a given period of time about a year in the future, by changing both marketing weight and farrowings. Figure 2 is based on 88 billion feed units, which is about the

[9] The breeding herd live weight is 20.3 pounds per pig marketed. Thus, the top line in fig. 1 shows the average live weight for all hogs. If 20.3 pounds are subtracted the result is the live weight of the butcher hog, which is the marketing weight that is referred to in this paper. The breeding herd consumes 290 feed units per pig marketed. In all input-output comparisons both the feed and the gain of the breeding herd are included.

[10] Feed is measured in feed units, using Jennings' values, USDA Circ. 670, 1943. A feed unit is equal to a pound of corn. One pound of tankage equals 2.5 feed units and one pound of soybean meal equals 1.75 feed units.

average annual feed consumption of hogs, 1940–42. Production of pork is shown on the vertical axis and production of fat, lard basis, on the horizontal axis. The curve shows the variations in each that are obtained by shifting the marketing weights.[11] The weights are indicated but the number of pigs is not shown. At the upper left section of the curve where pork production is largest and the fat

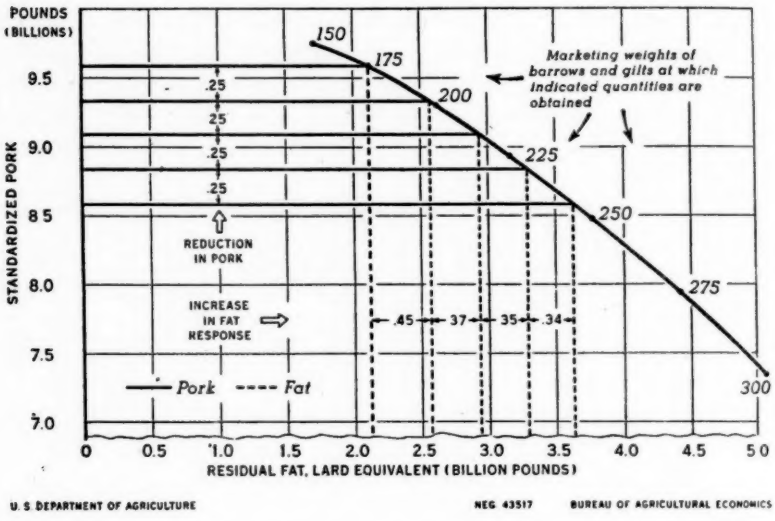

FIG. 2. ALTERNATIVE QUANTITIES OF STANDARDIZED PORK AND RESIDUAL FAT THAT CAN BE OBTAINED FROM 88 BILLION FEED UNITS

A given quantity of feed may be fed to a relatively large number of hogs marketed at light weights or to a smaller number of hogs marketed at heavier weights. As the marketing weight is increased, production of standardized pork is reduced and of residual fat is expanded. Beginning with hogs marketed at 175 pounds, increasing weights (and decreasing numbers) just sufficient to reduce pork by .25 billion pounds permits an increase in residual fat of .45 billion pounds. A second increase in weight that results in another reduction of .25 billion pounds of pork increases residual fat production only .37 billion pounds. Further increases in weight that result in equal reductions in pork bring about successively smaller increases in fat—.35 billion pounds for the third step and .34 billion pounds for the fourth.

[11] This curve (fig. 2) is one variety of an indifference curve which was employed by Edgeworth and recently developed by Hicks and Allen. The application here, which may be called a production indifference curve, is similar to the terms of trade application by Haberler.

Edgeworth, F. Y. Mathematical Psychics. London School of Economics and Political Science, 1932 Series of Reprints of Scarce Tracts in Economics and Political Science, No. 10, pp. 21–22.

Hicks, J. R. and Allen, R. G. D. "A Reconsideration of the Theory of Value." *Economica* 1934.

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yield is least, weights are low and hog numbers are high. Moving along the curve to the right and downward, pork declines and fat increases. Numbers gradually decrease and weights increase. The curve not only shows that fat production can be increased at the expense of pork for a given input of feed by increasing the weights and decreasing the farrowings, but it also shows the amount by which pork must be reduced to get increases in fat; this may be termed the pork cost of fat.

To determine the pork cost of fat, the standardized pork production from light weight hogs, say 175 pounds, is read off the chart as the base; then by successive steps the standardized pork production is reduced and the change in fat yield that can be obtained is observed. If hogs are marketed at about 175 pounds, 9.58 billion pounds of pork and 2.15 billion pounds of fat are produced. The procedure followed will be to see the effect on fat production of equal successive reductions in pork production. This will be accomplished by reducing hog numbers and increasing marketing weights.

If pork production is reduced 250 million pounds, fat can be expanded by 450 million pounds. Thus a pound of fat can be obtained by a reduction of 0.56 pounds of pork in this marketing range. Marketing weights are increased almost 25 pounds by this shift to 200 pounds. If pork production is reduced another 250 million pounds, fat can be increased by another 370 million pounds.

From the chart it can be seen that each successive equal reduction in pork makes possible smaller expansions of fat. There is an increase of 350 million pounds of fat for the third pork reduction of 250 million pounds, and 340 million pounds for the fourth, and so on. As hogs increase in marketing weight, the amount of fat that can be obtained from a given reduction in pork decreases. To put it differently, the pork cost of fat increases with each increase in marketing weight.

Retracing the steps taken on the chart, if standardized pork is increased by 250 million pounds, each successive increase in pork is accompanied by a larger reduction in fat. Thus, a given increase in pork production requires a greater reduction in fat yield in the case of light weight hogs than in the case of the heavier hogs. The marginal cost of pork, then, in terms of fat, decreases with increase in marketing weights.

These results are preliminary to the determination of the mar-

ginal feed costs of pork and fat for hogs marketed at various weights, which is the next step. Feed is assumed to be fixed in these calculations, but this does not limit the results. It merely simplifies the analysis. When the possibilities of a given quantity of feed are explored, it is a simple step to calculate the effect of changes in the feed supply.

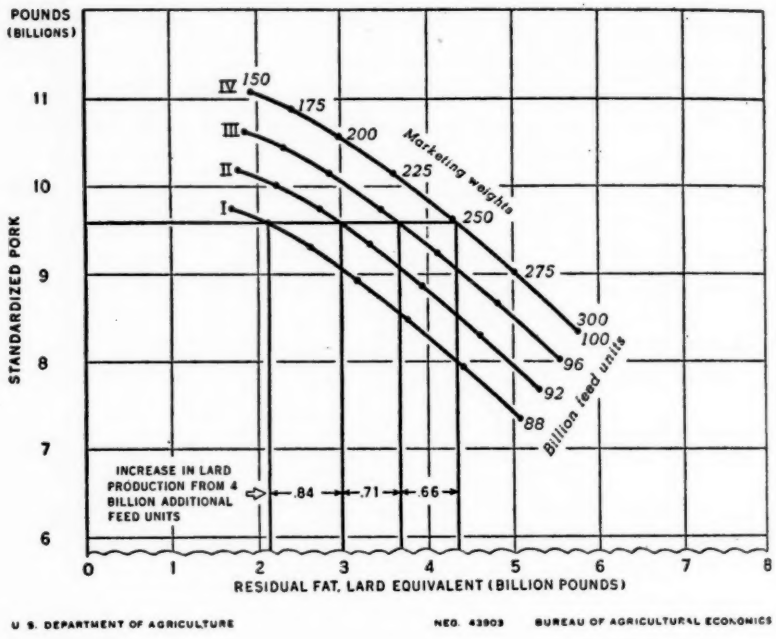

FIG. 3. MARGINAL FEED COST OF INCREASES IN TOTAL LARD EQUIVALENT PRODUCTION FOR THREE INCREASES IN MARKETING WEIGHT USING EQUAL CHANGES IN FEED CONSUMPTION

As marketing weight is increased, the marginal feed cost of lard rises. For the increase in weight from 175 to 210 pounds, 4 billion additional feed units increase lard by .84 billion pounds or at a marginal cost of 4.76 feed units per pound of lard. For the 2nd increase in marketing weight, the marginal cost is 4 billion divided by .71 or 5.63 feed units. For the 3rd increase in marketing weight, the marginal cost of lard rises to 6.06 feed units.

Independent Shifts in Standardized Pork and in Residual Fat; Varying Feed Supply

The possibility of simultaneous shifts in number of pigs farrowed and in marketing weights permits the use of the treatment of input-output measurement and marginal cost determination for "joint

products" that was developed by Marshall.[12] Pork and fat are joint products whose proportions can be—and are in practice—varied within rather wide limits. In the preceding section, increases in fat at the expense of pork were illustrated for a given feed supply. If changes in feed are introduced, either standardized pork or residual fat may be maintained at any given level while the other (pork or fat) varies.

Figure 3 is similar to figure 2 except that instead of a curve for one quantity of feed, four curves for four qauntities of feed are shown. As before each of the heavy lines shows alternative combinations of pork and fat that can be produced for each of the feed quantities. To figure the marginal feed cost of fat, it is necessary to hold pork production constant. Then the fat production can be increased and the increase in feed that is needed to obtain a unit increase in fat is the feed cost of this unit of fat. In figure 3 this is shown by beginning with production of 9.58 billion pounds of standardized pork and 2.15 billion pounds of (residual) fat obtained from 88 billion feed units fed to 96.8 million hogs marketed at 175 pounds. Moving horizontally from Curve I to Curve II (instead of along Curve I as was done in figure 2) pork production is unchanged while fat yield is increased from 2.15 to 2.99 billion pounds or an increase of .84 billion pounds by an increase in feed of 4 billion units which is the difference between each of the feed curves, by construction. The marginal cost of this increased fat then is 4 billion feed units divided by .84 billion pounds of fat, or 4.76 feed units. This same procedure can be repeated by moving horizontally from Curve II to Curve III, and then from Curve III to Curve IV. While pork production is unchanged, fat production increases from 2.99 to 3.70 and then to 4.36 billion pounds. Each move is toward a higher marketing weight for hogs. Note that the equal increases in feed bring smaller increases in fat as the weight of hogs increases. Thus the marginal feed cost of fat *increases* with each *increase* in marketing weight.

Curves similar to those in the previous figure are repeated in figure 4 to show the marginal cost of standardized pork. The principal difference is that to get appropriate changes in pork production it is necessary to increase feed more than for residual fat. Beginning with a marketing weight of 225 pounds, three equal in-

[12] Marshall, A. "Principles of Economics," 8th edition, p. 390. Appendix Mathematical Note XIX, p. 854.

creases of feed are shown. If marketing weights are reduced and the number of hogs marketed is increased so that fat production remains unchanged, as shown in figure 4, the successive increases in pork for each 20 billion feed unit increase are 2.54, 2.46, and 2.40 billion pounds. Thus with decreases in marketing weights, the marginal feed cost of pork increases, although very gradually.

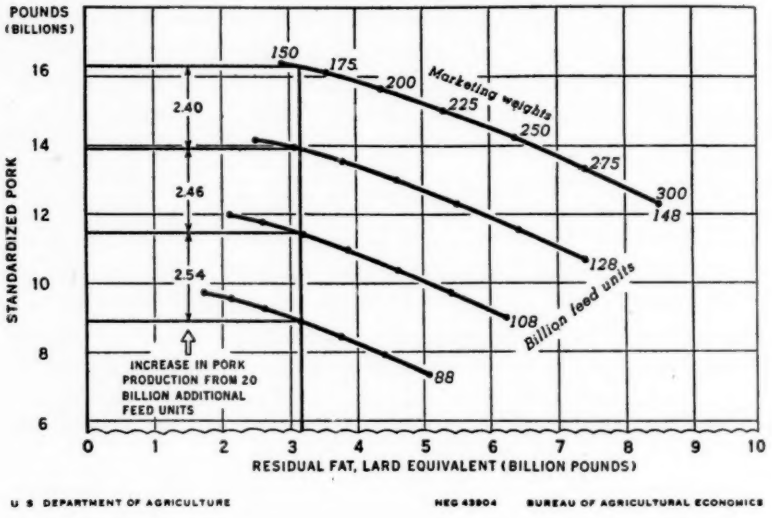

FIG. 4. MARGINAL FEED COST OF INCREASES IN TOTAL STANDARDIZED PORK PRODUCTION FOR THREE DECREASES IN MARKETING WEIGHT USING EQUAL CHANGES IN FEED CONSUMPTION

As marketing weight is reduced the marginal feed cost of pork increases. The reduction in marketing weight from 225 to 200 pounds increases pork production 2.54 billion pounds at a marginal feed cost of 7.87. For a 2nd reduction in marketing weight, 2.46 billion pounds of pork are produced and for a 3rd, 2.40 billion pounds, with marginal feed costs of 8.13 and 8.33 respectively.

Using the principle employed in figures 3 and 4, the marginal feed cost of standardized pork and of residual lard[13] can be determined mathematically for the marketing range for which the data are available. The three variables—standardized pork (p), residual lard (l), and feed (f)—were obtained as functions of live weight (w) of the hog. The functions used may be approximated by the following cubic parabolas:

[13] In this section the word *lard* is used instead of *fat* in order to avoid confusing fat and feed in the symbols of the equations.

$$p = 116.693 + 7.1085w - 0.91317w^2 - 0.030333w^3 \quad (1)$$
$$l = 41.347 + 12.0752w + 1.21087w^2 + 0.020361w^3 \quad (2)$$
$$f = 1149.788 + 124.2182w + 2.29460w^2 + 0.119722w^3 \quad (3)$$

In these equations p, l, and f, represent the "per hog" quantities of pork, lard, and feed; w represents market weight, coded by units of 25 pounds and expressed with 225 pounds as origin.

From these "per hog" relationships, it is possible to obtain equations showing the marginal feed cost of pork and of lard under conditions in which both the number of hogs farrowed and the market weight are variable. The final results are as follows:

$$\frac{dF}{dL} = \frac{6322.2 + 2635.4w + 276.28w^2 + 9.2379w^3 - 0.0397w^4}{1115.2 + 358.11w + 30.524w^2 + 1.0221w^3 + 0.0181w^4} \quad (4)$$

$$\frac{dF}{dP} = \frac{8747.8 + 2594.7w + 178.09w^2 + 2.1671w^3 - 0.0983w^4}{1115.2 + 358.11w + 30.524w^2 + 1.0221w^3 + 0.0181w^4} \quad (5)$$

In these equations F, L, and P represent total feed units, total pounds of residual lard and total pounds of standardized pork, while w represents market weight, coded as above. Thus dF/dL represents the marginal feed cost of lard, and dF/dP the same for pork. The final answers are shown at 25 pound intervals for the market range for which the data apply (table 1).

TABLE 1. MARGINAL FEED COSTS FOR STANDARDIZED PORK AND FOR RESIDUAL FAT[1]

Market weight of butcher hog	Marginal feed cost of residual fat	Marginal feed cost of standardized pork
Pounds	*Feed units*	*Feed units*
175	4.06	8.29
200	5.03	8.05
225	5.67	7.84
250	6.14	7.66
275	6.51	7.47

[1] Based on equations (4) and (5) above. For example at 225 pounds, all the terms of the equation are zero except the first.

$$\frac{dF}{dL} = \frac{6322.2}{1115.2} = 5.67$$

With each increase in marketing weight, the marginal feed cost of residual fat rises within the limits of the data. In other words, the feed required per pound of fat, making corrections for changes

in standardized pork, *increases directly* with slaughter weight.[14] The feed required (marginal feed cost) per additional pound of standardized pork, however, with correction for residual fat, *decreases* with each *increase* in marketing weight.

It does not follow, however, that if more pork is wanted, hogs should be fed to heavy weights and vice versa. If more standardized pork is desired rather than more fat, the change can be accomplished only by reducing weights and increasing the number of hogs marketed.

It does mean, however, that the reduction in marketing weight will have the effect of increasing the feed cost of the additional pork. Similarly, if residual fat is to be expanded, relative to standardized pork, marketing weights must be increased, and the effect of the shift in weight will be to increase the feed cost of the additional fat.

The trend of marginal costs as reported above is not what the writer had expected nor what is apparently the general "informed opinion." It was expected that the marginal feed cost of pork would rise as the slaughter weight of hogs increased and that the marginal feed cost of fat would decline, but these relationships were found to be just the opposite, as has been explained. The results obtained, however, have not been found to be at variance with any general economic principles. In fact there is some evidence that the results obtained are more reasonable[15] than those expected before the analysis was made, but the evidence is not definitive.

Use of the Marginal Feed Costs in Agricultural Policy

During the war, the United States Department of Agriculture in cooperation with the Land Grant Colleges has been setting goals for the number of pigs to be farrowed and for the weight at which they should be marketed. The present law that provides support for agricultural prices for two years after the war means that planning of production will not end with the war. Peacetime aims will differ from wartime aims, but it will still be necessary to choose between more hogs at lighter weights and fewer hogs at heavier weights as well as between the different classes of livestock. The

[14] It should be remembered that packers do not normally obtain higher percentage lard yields from heavier hogs than from lighter ones; thus the residual lard is not the same as visible fat, for a large part of it is usually marketed as "pork" cuts, e.g. backs, plates, etc.

[15] That is, fit in better with the general theory of marginal costs for joint products.

marginal feed costs of pork and of fat form a part of the essential data needed to make these choices in such a way that our resources are utilized most effectively for whatever ends are decided upon.

One of the principal advantages of planning agricultural production by means of the influence of price supports announced in advance is that some of the uncertainty is removed for the small-scale farm operator. Support prices for hogs would need to be announced for a full year in the future. For this type of planning both numbers and marketing weights are variables; the feed and gain of the whole hog enterprise needs to be considered, as was done in figuring the marginal feed costs above.

If, on the basis of current and prospective food supplies, it is decided for a planning year that meat should be emphasized at the expense of fat, this can be accomplished by increasing the farrowings and reducing the market weights. The marginal feed costs can be used to show the feed required for the additional pork and the savings in feed from the reduction in fat. They would also serve as guides in determining the extent of adjustment that is desirable.

The principal limitations in the use of the marginal data may well be repeated here. The feed-live-weight information is based upon many trials so that it is reasonably satisfactory, but the figures regarding the composition of the edible portion of the hog must not be considered final until more trials are reported. Moreover, the measurements used do not conform to the actual yields of pork and lard obtained by packers. But on the assumption that standardized pork and residual fat may be used as indexes of the broad nutritional values involved, useful conclusions can be reached.

POSTWAR AGRICULTURAL SETTLEMENT POSSIBILITIES IN CANADA

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THE present article is an attempt to summarize and explain in the briefest possible compass the main conclusions emerging from a comprehensive survey of agricultural settlement possibilities across Canada carried out under a directive from the Dominion Advisory Committee on Reconstruction. The manner of conducting the survey was as follows: The several provinces were requested to assemble such information as was already available or could be conveniently obtained on the settlement areas within their boundaries and on their physical and economic possibilities. The Dominion Department of Agriculture undertook to provide copies of all materials at their disposal as did other Federal agencies including the Census Division of the Dominion Bureau of Statistics, the Soldier Settlement Board, and the Prairie Farm Rehabilitation Administration. The Departments of Agriculture and Colonization of the Canadian National and the Canadian Pacific Railways contributed important documentary materials and valuable criticism and advice. Government, university and other authorities in all nine provinces were interviewed either by the author or a representative of the Committee and personal consultation was supplemented by correspondence—in some cases voluminous—with experts in all parts of the Dominion.

On the basis of the materials assembled, draft chapters were prepared on each of the nine provinces and submitted to appropriate provincial authorities for correction and criticism, and were revised in the light of the comments and suggestions received. As a result the materials embodied in this article may be said to carry the approval of senior departmental officials of the respective provinces with the exception of Quebec where the authorities withheld comment.

While much has been added during the past few years to our knowledge of agricultural settlement possibilities in certain sections of the Dominion, in other sections authoritative factual information is still very deficient. The conclusions concerning the latter must be regarded not only as tentative but liable to modification if and when more exact information becomes available. Indeed, for no portion of the Dominion is our knowledge by any means com-

plete, so that no part of the findings may be considered as final. Nevertheless from the materials available it has been possible to trace in broad outline, a picture of agricultural settlement possibilities across Canada which, inspite of its inadequacies may be of use in considering settlement potentials in the postwar years.

The Prairie Provinces

Practically all of the suitable arable land in the brown, dark brown and black park soil zones and a portion of that in the grey wood soil zone has long since been occupied. The remaining unsettled areas are located in the main on the northern bush-covered fringe of settlement and in the valley of the Peace. Information concerning the settled areas is of the sort supplied by reconnaissance soil surveys covering practically the whole of the region and by more detailed economic surveys covering large sections of it. Concerning the Northern fringe, however, our knowledge is less adequate. Information on soils is derived largely from a few widely separated traverses, surveyors notes, aeroplane pictures and the like. Meteorological records are incomplete and scattered and only preliminary reports are as yet available from the progress of settlers surveys now under way. Under these circumstances even the most authoritative estimates of available agricultural acreage are very rough approximations.

In the brown and dark brown soil zones the principal impediment to more intensive settlement is lack of precipitation. Controls of a different sort limit the extension of settlement on the northern fringe. Outside the Peace, much of the potentially arable land occurs in small scattered blocks and is economically inaccessible. There is also the relatively lower fertility of the grey wooded soils generally, the cost of clearing and breaking ($12.00 to $25.00 per acre), the remoteness from markets, the shortness of the growing season and the increased hazards from frost as one moves northward. All these factors must be taken into account in evaluating post war agricultural settlement possibilities in the Prairie Region. The picture seems to be about as follows:

(1) In the three *Prairie Provinces* there probably now remain not over 12,500,000 acres of reasonably accessible, arable *unoccupied* land on the fringe of settlement, plus, scattered over the region as a whole, perhaps a million acres of idle or abandoned acreage suitable for resettlement. There also exists considerable *occupied*

acreage that is by no means fully utilized as judged by generally prevailing standards of land utilization, but because of the scattered distribution of many such quarter sections, the continuing trend toward larger farm units and the growing willingness and financial ability of resident farmers to buy up these lands and incorporate them into presently existing farm holdings, it is questionable whether such land should be included in estimates of acreage available for the *extension* of settlement.

(2) On the basis of the mean size of farm obtaining in the districts in which available unoccupied and abandoned lands are located, room might be found on presently unused arable lands for as many as 40,000 farm families. Further, if it were found practicable to complete all irrigation projects proposed by PFRA engineers for the Prairie Region (which is decidedly questionable) provision would be made for an additional net increase of perhaps 13,300 farm units. Unused arable lands and possible irrigation developments combined thus might provide lands adequate for the establishment of some 53,300 new settlers and their families. The above estimates assume the continued prevalence of commercial (as distinguished from subsistence) farming, and the absence of any radical change in current practices of land utilization except as occasioned by the extension of irrigation.

(3) As an offset to the above figures, account should be taken of some thousands of farm operators at present on sub-marginal holdings in the Prairie Provinces. Their number is not large in Manitoba, but in Saskatchewan, responsible estimates place the figure in the neighbourhood of 18,000, of whom about half (or 9,000) should be moved to unused lands elsewhere. This number would be about adequate to settle the remaining 3,000,000 acres of usable land in the grey wooded soil zone on the northern fringe of that province. Similar figures are not available for Alberta, but informed opinion places the total very much lower than that in Saskatchewan. The figure may be around 3,000. The provinces naturally consider that resident farmers on sub-marginal holdings have a preferred claim on lands available for new settlement within the provincial boundaries.

(4) If one adds to the possible demand from the above source, that of demobilized members of the armed services, returning industrial workers and younger sons of present farm operators in the respective provinces, and includes with the unused land and

lands capable of irrigation, farm acreages that may become available through the retirement of present farm operators because of advancing age, it would appear that the prospective demand for farm holdings in the post war years about offsets the prospective supply in the provinces of Manitoba and Saskatchewan. Only in the province of Alberta is there reasonable assurance of any significant opportunity for the extension of agricultural settlement through extra-provincial immigration.

(5) Were one to relate the remaining unused and irrigable acreage to the rate of new settlement in the decade following the last war, one might conclude that the settlement of the Prairie Region could be completed in a matter of five or six years after the close of the present hostilities. Such is not likely to be the case. In the first place, the remaining unused lands are for the most part bush covered and their settlement will be more costly and less rapid than that of the open prairies. Moreover, the rate at which new areas will be occupied will be tempered by governmental insistence on future settlement being planned, directed and supervised. Such a policy would impose severe limitations on the number of new settlers that could be placed each year. In the second place, the development of large irrigation projects is a long-term proposition and in most cases some time will be required before their feasibility is even established. In addition, all such projects involve heavy, nonrecoverable government expenditures, the timing of which, if they are incurred, will probably be determined by considerations other than the desire to speed up agricultural settlement (e.g., the need for public works to maintain full employment). In the third place, the heavy relief expenditures of the nineteen thirties have created a strong prejudice in official circles against settlement under conditions where the margin of income over expenditures is not sufficiently large to insure the prospective settler against becoming a future public charge. Expressed in terms of practical policy, this attitude means *detailed* soil and other surveys before opening each new region for settlement, and the adjustment of the *tempo* of settlement generally, not only to the availability of suitable settlers but to the expansion of markets adequate to absorb the surplus product.

(6) The number of farm holdings could also be increased through the more *intensive* utilization of lands in the black park zone (and perhaps to some extent in the grey wooded soil zone) where precipi-

tation is adequate for livestock and dairy farming without irrigation. To bring about such a change, however, greatly expanded markets for such products would need to be not only assured, but sufficiently profitable to offset the forces favouring large-scale cereal production and induce a switch-over to animal products as the principal source of cash income. In view of the number of unpredictable factors in the situation, no judgment is possible as to the likelihood of such a development nor as to the possible extent of its effect, if it were to occur, on the density of agricultural settlement in the regions affected. The chances are that any increase in the density of settlement through this cause would be gradual.

(7) Just as the maintenance of existing agricultural settlement in the Prairie Provinces is dependent on the securing of markets comparable in size to those in the decade following the last World War, so the increase of agricultural settlement in this region, whether through the extension of occupied acreage or the more intensive use of lands already under cultivation, would seem to depend on the expansion of markets in the years following the present war.

(8) While research findings have demonstrated that many agricultural raw and waste materials originating in this region might be put to industrial uses, the economic feasibility of any *large-scale* utilization of such materials in the face of other competitively available sources of supply, has not been proven. Indeed, the evidence to date is such as to discourage the expectation of any *major* impetus to agricultural settlement through this cause in the near future. The same applies generally to the industrial demand for the non-agricultural resources of the region. This picture, of course, may change over night, but until it does, increased settlement will continue, as in the past, to depend largely on the expansion of export markets.

British Columbia

Because of its mountainous topography and heavy forest cover, arable acreage in British Columbia constitutes a relatively small proportion of the total area of the province; estimates range from 2 to 5 p.c. Agricultural settlement is limited to the Peace River Block in the north, the Central region bordering the east-west railway from Prince George to Prince Rupert, the semi-arid plateau of the South Central Interior, and to scattered smaller areas in the

river valleys and on Vancouver Island. Approximately 60 p.c. of the province is forest covered. To date only four and a quarter million acres have been subject to reconnaissance soil survey. Economic surveys and studies on the progress of settlers have been undertaken in certain districts but available authoritative infortion is still very limited. Virtually nothing definite is known as yet of the agricultural possibilities in the inter-range country north of Prince George which is credited by some with 500,000 acres of arable land, nor concerning other remote districts. These regions are accordingly excluded from the present discussion.

The factors controlling settlement in the Peace River Block of British Columbia are substantially similar to those in the adjacent section of Alberta. In Central British Columbia, the climate is about as severe as on the northern fringe of the prairies; precipitation is somewhat heavier. The soils when cleared are superior to the grey wood soils to the east, but inferior to the black park and dark brown soils of the Prairie Region. Cost of clearing and breaking is high. It is officially estimated at about $75.00 per acre but colonization experts believe that this figure can be reduced to $35.00 or less by proper organization and the use of recently developed techniques. In other parts of the province where timber stands are heavy clearing costs run into hundreds of dollars per acre. Limited local demand, relatively heavy transportation costs to large consuming markets and competition from the adjacent low cost prairie region have militated against the rapid development of the mixed farming and ranching in the interior sections of the province.

The agricultural potential insofar as it may be judged from available evidence which is admittedly inadequate, may be summarized as follows:

(1) In Central British Columbia there may be as much as 1,780,000 acres of usable arable land which, after deducting occupied acreage, would provide farm holdings with a quarter-section of arable land for about 11,000 new settlers. A rough estimate places the potential area suitable for settlement in the Peace River Block at 1,260,000 acres which, on the basis of a half-section farm unit, would accommodate some 3,900 farm families or a net addition of 2,400 to 2,500 beyond those already there. If as much as three-quarters of the abandoned or idle acreage in the province is suitable for resettlement another 130,000 acres should be added to the above figures and some 1,150-odd possible new settlers. Available

acreage in the Fraser Valley, the South Central Interior, Vancouver Island and in the other scattered sections of the province bring the total apparent, unused, arable land in the province as a whole to something in the neighbourhood of 2,500,000 acres, which might be expected eventually to provide locations for from 15,000 to 20,000 new settlers. It is impossible to be more explicit because of the paucity of reliable information concerning many sections of the province.

(2) If in addition, account is taken of occupied farms that may become available because of the advancing age of present operators, it would appear that the potential supply of arable lands in British Columbia is materially in excess of the prospective postwar demand on the part of residents of that province. Physical provisions might be made for several thousand agricultural immigrant settlers.

(3) It must not be assumed, however, that the settlement of these lands will be speedily effected. The official attitude in British Columbia is similar to that in the Prairie Provinces, as set forth above, and the physical problems and costs involved are even greater than in the grey wooded soils of Alberta and Saskatchewan. Moreover, the expansion of mixed farming in Central British Columbia (where a large part of the available acreage is located) will continue to be adversely affected by the presence of low cost surplus-producing areas in the adjacent Prairie Region. The British Columbia farmer must meet this competition if he is to secure a larger share of the local market for livestock and livestock products. There is no present expectation that the region can successfully produce such products for export.

(4) The possibility of developing a type of forestry where those engaged would have small arable acreages to supply their domestic requirements is being investigated, and if some satisfactory plan is devised, considerable numbers of new settlers might be located in the forest areas as part-time agriculturalists.

(5) With regard to local markets, there are reasons to expect that these will gradually increase with the development of industries utilizing both agricultural and non-agricultural raw materials. Some of the prospective industrial development will be designed to meet local demands e.g., the new flax fibre industry; but much of it will depend on the existence of favourable export markets. This is true of many of the proposals for expansion in the food processing and pharmaceutical fields and in industries utilizing the forest and

mineral resources of the province. Indeed, through the production of specialty crops, agriculture itself is becoming directly and increasingly dependent on extra-provincial demand. While it is probably true that in British Columbia there is not as close and direct a connection between agricultural settlement and export markets for agricultural products as in the Prairie Region, the indirect connection through the mineral, forestry and fishing industries is a factor of major importance.

Ontario

In Ontario, opportunities for the extension of settlement are confined to the northern part of the province lying within the Canadian Shield. The largest areas of arable land are found in the Great Clay Belt of the Cochrane Plain and in the Little Clay Belt in the Temiskaming region. Other smaller blocks of arable acreage are located in the Rainy River, Thunder Bay and Dryden districts. In the whole of Northern Ontario, some 3,370,000 acreas have been covered by reconnaissance survey, and associations have been established between forest cover and soil types. With the assistance of aerial photography a preliminary generalized soil map of the Clay Belt has been produced. Ottawa authorities are withholding official recognition of this map until the work is re-checked and a broader base secured for establishing associations between soils and forest cover. The competence of the soil surveyor who did the work is not in question but the results are so at variance with preconceived and widely publicized views as to warrant further investigation. In the meantime, the findings comprise the most reliable—indeed the only scientific—information as yet available concerning the general soil types in this section of the province and as such are used in the ensuing discussion. Recently completed progress of settlers and marketing studies add materially to our knowledge of conditions attaining in the Clay Belt.

The principal climatic control is the severe winter and the moderately short growing season. Precipitation is abundant. The soils are definitely inferior to the better soils in the Prairie Provinces and Southern Ontario and after the removal of bush cover and peat, require some years of skillful cultivation before attaining full productivity.

The more important conclusions as to the possible extension of settlement in the region are as follows:

(1) Preliminary surveys suggest that in the whole of Northern

Ontario there is a total of about 1,700,000 acres of A grade land[1] and 2,750,000 acres of B grade land suitable for full-time agriculture, which on the basis of 160 acres of arable land per farm, would provide farmsteads for some 28,000 operators. In 1941, there were something over 12,000 occupied farms in this region, and were provision made to move such of the present settlers as are on low to better grade lands, it would appear that suitable land may be available to accommodate as many as 16,000 additional purely agricultural settlers in this region. The weight of evidence supports the view that the remaining C grade land (about 6,000,000 acres) should be kept in forest and operated with agriculture as a part-time subsidiary provided some workable and stable combination can be found; and that the balance of the low grade land (perhaps 10,000,000 acres) be devoted exclusively to forestry.

(2) If one adds to the unused lands available in Northern Ontario say half of the idle or abandoned lands in Southern Ontario and the farms that will become available through the normal ageing of present farm operators, it would appear that, like Alberta and British Columbia, the province of Ontario has arable lands considerably in excess of the prospective demand of her own population for farm holdings during the postwar years. The excess acreage may well be adequate to accommodate 10,000 to 15,000 agricultural settlers from outside the province—perhaps more.

(3) Yet there are several reasons why the settlement of these lands may not be as rapid as one might hope. As in the Western provinces, official opinion is that future settlement should be planned and supervised. Past settlement procedures in the North country have not been entirely satisfactory. Moreover, as with Central British Columbia, the agricultural settler in Northern Ontario has to face competition in the products he is best able to produce, from the low cost surplus-producing Prairie Region adjoining the province on the West—as well as from the older settled parts of Ontario to the South. Besides, much of the better land occurs in long narrow strips on either side of the many rivers traversing the region from North to South. This adds to the difficulties and costs of settlement. Much research, experimentation, education and organization work remains to be done before the problems involved in the settlement of this area are solved, and its development will involve substantial further outlays by governing bodies.

[1] Mr. G. A. Hills, Dominion Land Surveyor, states that A grade land in Northern Ontario is about equivalent to C grade land in the Southern part of the province.

(4) Local markets, however, are adequate to absorb greatly increased amounts of agricultural products from the local farm operators. In the Great Clay Belt, resident farmers are supplying only about one-fifth of the local urban requirements of farm produce despite the one-way freight advantage from outside points.

(5) In Ontario, the industrial processing of agricultural products is already further advanced than in the Canadian West. The writer has found nothing to suggest that prospective developments, either in these industries or in those using other classes of raw materials, are likely to be such as to induce any radical or rapid increase in the density of agricultural settlement.

Quebec

Physiographically, the Province of Quebec may be divided into three regions, viz., the Canadian Shield which occupies most of the central and northern parts of the province, the St. Lawrence Lowlands on either side of the river as far east as Quebec City and including the island of Anticosti, and the Appalachian Highlands lying east of a line joining Quebec City and Lake Champlain and extending to the provincial boundary.

The Canadian Shield is underlain by hardened sediments and igneous rocks. As in the Ontario section the topography is uneven and the soil cover largely removed by glaciation, though over a great part of the area sufficient has been retained to support a forest growth (though insufficient for agriculture). Generally speaking, therefore, the physiographic and soil conditions are not suited for agriculture except where sediments deposited in the basins of glacial lakes have reduced the inequalities of the surface and produced arable lands, e.g. in the Clay Belt of Abitibi and Témiscamingue counties and in the Lake St. John region, and in a zone of Piedmont some 50 to 80 miles wide in places, between Ottawa and Quebec, along the outer edge of the region. Much the same situation obtains in the Appalachian region. In this section of the province, arable land is confined largely to the few river valleys stretching inland from the St. Lawrence and the Atlantic and to the narrow fringe of low lying land skirting the northern and eastern shores. In the St. Lawrence Lowlands all suitable agricultural land has long since been occupied.

Because of the generally uneven topography of the province as a whole and of climatic and other limitations in the far north, actual and potential agricultural land constitutes a relatively small

proportion of the total area. Moreover, much of the potential agricultural acreage is so far north, so inaccessible, so costly to reclaim, so unevenly distributed or so low grade that though its cultivation might be physically possible, its use would be quite uneconomic at the present time.

Accurate information regarding land settlement possibilities in the province of Quebec is much more deficient than in Ontario. Progress of settlers and marketing studies have been made in northern portion of the province, but soil surveys are almost entirely lacking. Practically none of the unused lands of the province have been covered by even reconnaissance survey. The ensuing conclusions concerning agricultural settlement potential must be regarded as very tentative and possibly somewhat wide of the mark.

(1) Early estimates placed the acreage available for agricultural settlement in the province at an unduly high figure which has been progressively reduced as the bases of estimation have been subject to more rigid examination and additional information has been obtained concerning the areas in question. The most recent official estimate was made in 1943. In that year, the Deputy Minister of Colonization stated that there still remains in the province suitable unsettled land for about 100,000 new agricultural farm holdings or in the neighborhood of 10,000,000 acres—or 12,000,000 at the outside.

If the findings of the soil reconnaissance and aerial survey in the Ontario section of the Clay Belt should be found on investigation to reflect conditions in the Quebec section (where most of the province's unused lands are located), further drastic downward revisions in the estimates may well be necessary. Indeed, available meteorological data indicate that a considerable portion of the 6,000,000 acres credited to the unorganized portion of Abitibi County is beyond the climatic margin of agricultural use.

Of course in Quebec, the criteria for judging the suitability of land for agricultural settlement are somewhat different from those in Ontario and the Canadian West, where lands are assessed with a view to their use for commercial agriculture. Subsistence agriculture prevails in the colonization areas of French Canada and farming is regarded more as a way of life than as a business enterprise.

Nevertheless, after making allowance for differences in stand-

ards of suitability, there are grounds for suspecting that even the latest official figures on available agricultural acreage will be found to be as much as 25 to 30 percent too high. Perhaps a figure of 7,500,000 acres and 75,000 farm holdings might be accepted tentatively as a safer estimate of the agricultural settlement possibilities in this province.

(2) If to these figures one adds such of the 5,321 idle or abandoned farms (535,000 acres) as are suitable for resettlement, and another 10,000 or more farms which will become available through the ageing of present operators, it is clear that Quebec has unused agricultural lands materially in excess of the prospective postwar demand of her own citizens for new farm holdings.

This circumstance must not be taken to mean that these surplus lands will be available for settlers from elsewhere. It is definitely the policy of the province to retain them for her own people. Under the present colonization policy their settlement will be spread over the next three or four decades.

(3) While new settlers in Northern Quebec encounter the same types of difficulty as those in Northern Ontario, the admirable settlement policy of the province of Quebec and the philosophy of the settlers themselves are effective offsetting factors. Local urban markets are adequate to absorb all of the produce that a much larger farm population will have for sale. It is, therefore, reasonable to count on a progressive and orderly extension of colonization in this (and other areas within the province) after the war.

(4) What has been said about the probable effect of prospective industrial development on agricultural settlement in Ontario would seem to apply equally to the province of Quebec. The same is probably true concerning the possible extension of forest settlement with agriculture as a part-time subsidiary.

The Maritimes

(1) In the Maritimes as a whole, the trend in the number of farms and in occupied farm acreage has been downward for the past several decades, so that an extension of settlement would involve a reversal of a long established over-all trend. In New Brunswick, the most recent authoritative opinion places the maximum acreage that *could* be farmed at 30 percent of the total area of the province or 5,300,000 acres, of which only a limited portion is really suitable farm land. Approximately 80 p.c. of the area of the province is in

forest. Occupied agricultural acreage in 1941 was just under 4,000,000 acres. Opportunities for the extension of agricultural settlement in this province would thus appear to be relatively limited, although recent experience has shown that it is possible to promote successful settlement (on a part-time basis with forestry) in the four Northern counties. By and large, however, informed opinion favours using presently forested areas for forestry rather than agriculture. In New Brunswick and Nova Scotia combined, there are some 100,000 acres of marshland that might be reclaimed, but such land when reclaimed would not appreciably increase the number of farm operators in these provinces. It would rather improve the economic status of upland farmers who would make use of the acreage to round out their farming operations. A review of the available evidence on Nova Scotia suggests that save for a possible moderate extension of part-time farming, no significant possibilities exist for the extension of agricultural settlement in that province either at the present time or in the immediate future. Such development as is likely to take place promises to be in the direction of the more intensive and effective use of present farm acreage with a resulting higher standard of life for its present occupants. The same applies to Prince Edward Island, where occupied agricultural land constitutes 94.5 percent of all potential farm land.

(2) That is not to say that much cannot be done through better farm practices, the securing of enlarged export market, the encouragement of tourist trade, the reorganization and revival of the fishing industry, the increase in the number of processing plants for agricultural raw materials, etc., to increase agricultural production and improve the status of resident farm operators.

(3) Only in New Brunswick are usable farm lands available to meet the prospective demand for new farm holdings on the part of residents of the province, and it is more than probable that, as in the past, many young men will prefer unused lands in other parts of Canada, to those within their native province.

(4) Recent studies are by no means pessimistic concerning prospective industrial expansion in the Maritime section of Canada,[2] but save for a possible stimulus to part-time farming through

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[2] See for example, *The Economic Effects of the War on the Maritime Provinces of Canada* (publication of the Institute of Public Affairs, Dalhousie University) by B. S. Keirstead. See also, Submission of the Province of New Brunswick to the Special Committee on Reconstruction, Ottawa, December 2, 1943.

the reorganization of the fishing industry, such expansion as may be expected is not likely to be on a scale adequate to bring about any radical change in farm practices or provide any significant impetus to more intensive agricultural settlement.

The Yukon and Northwest Territories

Exploratory surveys during the past two summers have established the existence of considerable acreages of physically arable land mostly in the region tributary to the MacKenzie River but these lands are so inaccessible, and exact knowledge concerning their soils and climatic environment is so limited, that, like the inter-range country of Northern British Columbia, they are not included in the present survey of agricultural settlement possibilities in the post war years. This omission finds further justification in the fact that the balance of informed opinion regards both the tempo and the extent of their possible future development as dependent on the expansion of local markets through the exploitation of the non-agricultural resources of the region. In this matter reasonably accurate prediction is as yet quite impossible.

Canada as a Whole

The over-all picture for Canada as a whole thus suggests something between 27,000,000 and 29,000,000 acres of unused, reasonably accessible land which is regarded as physically suitable for agricultural settlement by experts in the provinces in which they are located.[3] Included in both these totals are 10,000,000 acres in the province of Quebec, which, for reasons stated above, may well prove an over-estimate by 25 percent or more, in which case the above over-all limits would be reduced to say 25,000,000 to 27,000,000 acres. Whatever its exact amount, provincial authorities in the province of Quebec hold the view that all unused agricultural land in the province will be required to provide farm holdings for the increase in local farm population expected during the next few decades.

Unused agricultural land in Canada outside Quebec is estimated at between 17,000,000 and 19,000,000 acres, which acreage, on the basis of land utilization practices in the regions in which it is located, might be expected to accommodate between 70,000 and

[3] Potential agricultural acreage in the Yukon and Northwest Territories is not included in these totals for reasons stated in the text.

80,000 full-time agricultural settlers. Proposed irrigation projects in the Prairie Region, if and when completed, would provide for a further net increase of something over 13,000 farm units. The total potential increase is thus set at between 83,000 and 93,000. These are outside figures. Detailed investigation has yet to demonstrate the physical and economic feasibility of much of the proposed irrigation development.

Present operators on sub-marginal holdings are regarded by provincial authorities as having a preferred claim on unused agricultural lands. The number of operators in this category who *should* be moved to other locations is placed at 9,000 in Saskatchewan; in the absence of any authoritative estimate for Alberta, a figure of 3,000 is accepted as a reasonable guess, making a total of say 12,000.[4] How many will or can be moved is not known, but in the meantime, the provinces concerned feel that alternative holdings should be reserved in the unsettled districts within the provincial jurisdiction. Such being the case, a figure somewhere between 71,000 and 81,000 might be taken as more appropriately representing the number of new farm holdings, outside Quebec, potentially available for the *extension* of settlement after the war.

One gathers from provincial experts that the probable time required to properly develop this potential will be between ten and twenty years, assuming, of course, that it is economically feasible to proceed without interruption and in an orderly manner. In some provinces the development would probably be more rapid than in others.

In addition to full-time agricultural settlers, many foresters may be placed on small agricultural holdings in the vast forested areas across Canada as more effective ways of combining forestry and part-time farming are devised. The number may run to many thousands. There is scope also for the extension of part-time farming in combination with the fishing, mining and urban industries generally. Settlement opportunities likely to be offered by possible developments in these several fields cannot be assessed at the present time, yet they constitute an important part of the post war picture.

In three important regions outside Quebec, viz., Northern Ontario, Northern Alberta and Central British Columbia, lands suit-

[4] The removal of operators from sub-marginal lands in Northern Ontario was provided for in the over-all estimates employed above.

able for full-time agriculture are available in excess of the immediate prospective requirements of residents of the provinces in which they are situated. Their combined settlement potential is placed at something over 50,000 new farm families. Out of this total, provision must be made for a limited number of demobilized members of the armed services, for whom farm holdings are not available elsewhere, as well as for some persons returning to agriculture from war industries. In addition, there will be the requirements of such of our surplus rural population as desire to settle in these districts as they are developed. No precise estimate of these total domestic requirements is possible, but if they were to amount to as much as half the total supply, there would still be accommodation for some 25,000 immigrant settlers. The actual figure may be appreciably higher—or somewhat lower. It cannot be determined in advance, but obviously there is a definite limit to the number of agricultural settlers Canada can accept from abroad.

Similarly, the increase of settlement that may occur through the more intensive utilization of lands already occupied cannot be determined with any degree of precision. Increased settlement, whether through the extension of agricultural acreage or its more intensive use, is conditioned ultimately by the demand for agricultural produce.

In this connection, the studies of Dr. McFarlane, Dr. Saunderson and Dean Kirk, which summarize all authoritative evidence concerning *possible industrial uses of agricultural products*, indicate that in view of the fact that plastics, alcohol and other important products can be made much more cheaply from raw materials of non-agricultural origin, no phenomenal increase in the industrial demand for agricultural products is to be expected in the post war period. A gradual increase is assured, but it is definitely not likely to be on a scale sufficient materially to affect agricultural settlement possibilities. Moreover, such fragmentary evidence as the writer has been able to secure suggests that the same is likely to be true of our industrial development generally.

As to the possible increase in domestic demand through *improved dietary standards*, Dr. W. C. Hopper of the Economics Division, Dominion Department of Agriculture, finds that to raise the diet of every Canadian to the standard established by the Canadian Council on Nutrition would require an increase of about 2,000,000 acres to provide feed for dairy cattle and the necessary additional

fruits and vegetables.[5] This is about equivalent to the acreage that would be freed if our annual exports of pork and bacon to Great Britain were reduced by two hundred and seventy-five million pounds. It is equivalent in amount to approximately 8 percent of our estimated available unused agricultural lands. Clearly, any major impetus to agricultural settlement in the Dominion, if it is to come from improved nutritional standards, must come through increased export demand arising from improved dietary standards in other countries.

That is not to say that the supplying of adequate dietary requirements of our own population might not result in the employment of more labour on our farms. That will depend in large measure on the economies in labour effected by the new farm implements that have been specially designed for use on smaller farms after the war.

The above analysis and conclusions are based on the assumption that settlement programs (at least outside Quebec) will aim at the development of commercial rather than subsistence agriculture. Such is generally the intention, and for reasons that seem proper and adequate to provincial officials. It may be that subsistence farming could form a permanent part of the agricultural economy of English-speaking Canada just as wage differentials persist in the cities. There are arguments on both sides. The fact is, however, that that type of settlement is not regarded with favour by the provinces controlling most of the remaining unused agricultural acreage.

Finally, it must not be inferred from the emphasis placed on the physical and economic determinants of agricultural settlement, that the author holds the view that physical and economic factors should or will be the sole determinants of future settlement policy. Political and humanitarian considerations will bulk large in the post war world and may not always conform with that which is economically desirable. Under such circumstances, compromise is inevitable—but such compromise as is within the limits set by physical and economic controls.

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[5] *Food Consumption in Canada in Post-War Years with Special Reference to Nutritionally Adequate Diets by S. C. Hopper.* Paper delivered at CSTA Convention, Toronto, June 28, 1944.

POSTWAR LAND SETTLEMENT OPPORTUNITIES IN THE NORTHERN GREAT PLAINS*

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AN OVERALL analysis of agricultural resources, demand for agricultural products, and available labor force in relation to the probable number of postwar land settlement opportunities in the Northern Great Plains is contained in this article. The ways in which individual settlers may be aided or guided in seeking these opportunities are not considered.

The Northern Great Plains contains the western margin of the Corn Belt and much of the marginal wheat land of the country. About 68 percent of the land in the Northern Plains is used for grazing. Except in the eastern part and certain local areas elsewhere in the region, the grazing makes possible an extensive type of livestock production. The production of the Plains is subject to wide annual fluctuations due to variations in precipitation and temperature.

Most of the agricultural products of the Plains are consumed in other parts of the United States and in foreign countries and so must be transported considerable distances to market. Wheat, the principal cash crop, enters the export market in quantity. As wheat occupies more land than any other crop, the level of foreign trade is important to the region.

Because of the marginal nature of much of the agriculture of the Plains, price shocks that come from the fluctuations of the national economy have a serious impact. When low periods in agricultural production coincide with low prices for farm products, the effects of both are multiplied. On the other hand, a combination of high production and high prices for the production brings a boom period. These extremes make it difficult to establish any concept of a normal period or normal income or normal value level.

The postwar economic situation will have an important bearing on agriculture in the Plains. It has been estimated that if we have

* Some of the material for this article is drawn from an analysis made by staff members of the BAE, Lincoln, Nebraska, for the Northern Great Plains Council's subcommittee on Economic and Social Adjustments and submitted in a committee report "Land Settlement Opportunities in Relation to Postwar Economic Conditions, Northern Great Plains." Data for the Northern Great Plains are the totals for the seven States of North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming and Colorado.

full employment and the 1943 price level, the national income would be about 150 billion annually. With this level of national income, foreign and domestic demand for farm products would absorb an output not greatly different from the 1943 production.[1] This would bring only minor adjustment problems for agriculture in this region, except in wheat farming—the world is still carrying a wheat surplus. Any lessening in economic activity will create severe maladjustments in the agriculture of the Plains.

Adjustment of Population to Resources

One measure of a region's resources is its ability to support population. While some areas were expanding and others declining, total farm population in the Northern Plains about 1920 reached a rather stable level which continued until 1934; then its farm population decreased about 400,000 from 1934 to 1940.

The farm population of the Plains has a natural increase that is greater than needed for replacement, and so people have migrated from the farms to cities. From 1920 to 1930 the net change in the rural farm population due to migration was lower in the Plains than the national average. Only in Montana did the migration rate exceed the national average (table 1).

TABLE 1. NET CHANGE IN RURAL FARM POPULATION DUE TO MIGRATION 1920–30, 1930–40

State	1920–30		1930–40	
	Thousand	Percent	Thousand	Percent
Montana	− 51	−22.4	− 43	−23.0
Wyoming	− 6	− 8.8	− 9	−13.0
Colorado	− 31	−11.7	− 59	−22.6
North Dakota	− 71	−18.0	−110	−29.9
South Dakota	− 43	−11.9	−115	−31.8
Nebraska	− 95	−16.2	−137	−25.4
Kansas	−125	−17.0	−145	−22.4
United States	−6,300	−20.0	−8,498	−12.7

Source: USDA Misc. Pub. 265, November 1937, and BAE mimeographed report "County Variations in Net Migration from Rural Farm Population, 1930–40," December 1944.

In the period 1930-40 the net change in farm population due to migration far exceeded the national average—in only one State, Wyoming, was the migration rate about the same as the average. In all the others, the rate was about two to two and one-half times

[1] This estimate of probable demand is taken from "What Peace Can Mean to American Farmers," an unpublished study by the Bureau of Agricultural Economics.

the national average. The net loss due to migration during this drought period was over 600,000. This meant tremendous adjustments in the number of farms and the use of resources. From 1930 to 1940 the number of farms decreased from 580 thousand to 532 thousand.

Many farm people were forced to leave the Plains even though the alternatives on the West Coast and elsewhere were not very good. Such a migration had been forced in small areas in the early years of settlement, but this was the first time that so large a part of the region was involved (table 2). Fifty-five percent of the counties in the Northern Plains had a net migration loss of over 25 percent.

TABLE 2. DISTRIBUTION OF COUNTIES IN THE NORTHERN GREAT PLAINS REGION BY PERCENTAGE CHANGE IN THE RURAL-FARM POPULATION DUE TO MIGRATION, 1930–40

Percentage change	Distribution of counties	
	Number	*Percent*
Greater than −45 percent	21	4.6
−45 to −35 percent	79	17.2
−35 to −25 percent	153	33.3
−25 to −15 percent	127	27.6
−15 to − 5 percent	50	10.9
− 5 to 5 percent	15	3.3
5 to 15 percent	2	.4
15 to 25 percent	9	1.9
25 to 35 percent	3	.6
35 percent and over	1	.2
Total	460	100.0

Source: "County Variation In Net Migration from The Rural-Farm Population, 1930–40," Eleanor H. Bernert, BAE, USDA, Washington, D. C., December 1944.

War has brought many additional shifts in the total population pattern in the Northern Great Plains States—urban as well as rural. The probable situation at the end of the war can be visualized only through a careful study of these changes. Census estimates for these seven States, based on ration book 4, indicate a civilian population decrease to 5,709,000 as of November 1, 1943. This is a loss of 606,000 thus far during this war or about 9.6 percent of the total civilian population in 1940. When the estimated natural increase in the population of 189,000 for this period is considered, the gross civilian population loss appears to be about 795,000. Probably one half of this loss was accounted for by the armed forces and the rest by out migration. Additional loss in the total population will probably occur from 1943 to the end of the war.

The farm population of the region was declining during this same period. Preliminary estimates indicate a decline of 18 percent from 1940 to 1944. This represents a farm population loss of nearly 400,000, almost equal to the farm population loss during the drought period. This loss has been to the armed services, to the towns and cities of the region, and to migration out of the region. The farm population in 1944 is about 30 percent less than in 1930. As the agriculture of the region has been prosperous since 1940, the farm population loss, beyond those entering the armed services, must be due in considerable measure to retirements and to migration to better opportunities elsewhere. Very little information is available as to what has happened to the number of farms and the size of farms, but it seems probable that the number has declined at least 5 percent since 1940 and that the land vacated has been combined with other farms. If this is true, it would seem to indicate that permanent adjustments have taken place in the agriculture of the Plains.

Impact of Demobilization

The Bureau of Labor Statistics has estimated that about 547,000 workers will be demobilized in the Northern Plains in the immediate postwar period.[2] About 393,000 would be from the armed forces and 154,000 from war work in the region. The relative size of this total group is indicated by the fact that it is 27 percent of the total number employed in the region in 1940. This is a rough estimate, of course, and only approximates the size of the demobilization problem because many lines of employment have been stimulated by the war. These contributing industries and services may not continue at the same level. The impact of demobilization will depend to a considerable extent on the period of time over which demobilization takes place and the general level of economic activity that is maintained.

There is no way of learning accurately, in advance, the number of men who will want to enter and return to farming because it depends to some extent on the relative position of agriculture and alternative opportunities during the demobilization period. A recent study of postwar occupational plans of officers and enlisted men gives the estimate that there are "about 800,000 men in the

[2] This estimate is taken from an article in the Monthly Labor Review, July 1943, entitled, "Relative Severity of Post-War Demobilization by States," prepared by Emile Benoit-Smullyan, Bureau of Labor Statistics. The estimate assumes that about 77 percent demobilization of the armed forces will occur in the immediate postwar period.

Army alone with plans to farm, as of Summer, 1944."[3] This study also indicates that about the same number plan to farm as left farming to enter the Army and that they will return to the same general region where they lived before. About two-thirds of the men who definitely plan to farm have in mind a particular farm which they expect to operate or work on.

Applying the results of this study to the Northern Plains, it may be concluded that about the same number plan on farming in the region as left to enter the Army. On the basis of the relation of the farm population of the Northern Plains to the nation as a whole, this number is estimated at 45 to 50 thousand planning to return there during the immediate postwar period. Many of these men will have definite plans, often to take over or work on the family farm, but at least one-third will not have definite plans and will be looking for a farm.

Probably not a great many of the workers who have gone to war work in other areas will return.[4] Some of the workers in war plants in the region may want to enter or return to farming, but no information is available as to their intentions.

The exact number will be determined by economic conditions, but it seems probable that most farm seekers in the immediate postwar period who are not now on farms will be men from the armed forces who have had farm experience in the Northern Plains. In addition, there will be some from the armed services and a small number from war industries who have had no farm experience. Although the majority of these men were apparently not farm operators when they entered the armed forces, most of them now plan to enter farming as operators.

An appraisal of their prospects is now attempted.

Farm Vacancies

Many people believe that there will be numerous opportunities on existing farms as the older farmers want to retire. For example, the Land-Grant College report on Postwar Agricultural Policy says

[3] "Soldier's Plans For Farming After They Leave The Army," Post-war Plans of the Soldier Series Report No. B-131, 20 December 1944, Information and Education Division, Headquarters, Army Service Forces.

[4] Nearly 16,000 workers originating in this region were employed on war work in Portland, Oregon, area in 1943 (*The American City*, Dec. 1943). A survey of workers in Kaiser's shipyards indicated: 21 percent with plans to stay in the Portland area, 31 percent would stay if they could get jobs, only 24 percent declared they would leave for home when their war jobs are finished. The rest were undecided (*Business Week*, March 4, 1944). The uncertainty of their plans was indicated by the fact that 86 percent had no postwar job in prospect.

"The largest opportunities for veterans or others to return to farming are on existing farms of known productivity from which older operators wish to retire—and many will retire, since the average age of farmers is now high."

Farm operators apparently retired at a lower rate from 1930 to 1940 than in the period from 1920 to 1930. The question arises whether this slow rate of retirement during the depression has continued during the war years. If it has, more farming opportunities will be available at the end of the war than otherwise would be the case.

Recent studies in a few selected areas indicate that 1.8 percent of the farmers retired during the period 1941 to 1942.[5] This is about twice the rate which normally is expected. Further, the rate of retirement was 2.9 percent from 1942 to 1943 and 3.3 percent from 1943 to 1944. This study cannot be considered conclusive, but it does suggest that there may not be so many delaying their retirement as is frequently assumed.

This same study indicated that nearly 2 percent of the farm operators left annually for other employment. This rate of change in occupation from 1941 to 1944 can be considered above normal; a lower rate should be expected to prevail after the war. Change from farm to nonfarm occupations is very difficult to estimate since it depends so heavily upon the relative prosperity of agriculture and industry.

In a 16-county survey made in Montana, about 8 percent of the operators indicated that they plan to retire during the first year after the war is over.[6] No check was made on the number who planned retirement during the succeeding years. A survey made by the Research Division of the Farm Credit Administration through the secretaries of the National Farm Loan Association indicates that 38 percent of the owners and 12 percent of the tenants plan to retire after the war, but no check was made as to how soon after the war these operators would retire.[7] A survey in South Dakota

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[5] An unpublished study of tenure trends in Montana, South Dakota, Nebraska and Kansas by the Bureau of Agricultural Economics. About 2,300 operators included in study for period 1941–1944. Records show change from one AAA sign-up to another.

[6] Letter from R. B. Tootell, Agricultural Economics Department, Montana State College.

[7] "Postwar Plans of Farm Boys and Need for Farm Financing," Research Division, FCA of Omaha, June 1944. This report points out that "close study of the data suggests that the sample includes a larger-than-average proportion of farmers about ready to retire and that the actual percentage of all farmers retiring after the war will be less than the rates stated." This is probably true of the Montana and South Dakota studies to a less extent.

indicates that 8.0 percent of the operators plan to retire after the war, presumably during the first few years.[8] The suggested rates of retirement in various areas of the State ranged from 7 to 11 percent. In fact, all three of the above studies indicate considerable variation in the rate of contemplated retirement, from one area to another and from one year to another, depending upon such factors as age composition, tenure status of operators, and general economic conditions.

Intentions to retire probably are always higher than actual retirements, because so many things can disrupt personal plans, even over so short a period as two or three years—crop failures, unexpected financial losses, unexpected expenses. Then, too, many operators are evidently not delaying retirement until after the war, but are taking advantage of the current high prices they can get for their machinery and the strong land market.

Estimate cannot be accurate, but retirement and death could make farms available in the Northern Plains at the rate of 15,000 annually in the next few years following the war. All of the farms vacated will not become available to new operators because many will be taken up by family members already on the farm. A recent study by the Bureau of Agricultural Economics indicates that the Northern Plains, like most farm areas, has a high replacement rate.[9]

	Replacement rate 1940–50
North Dakota	189
South Dakota	184
Nebraska	169
Kansas	145
Montana	138
Wyoming	158
Colorado	159
United States	167

In North Dakota, for example, "vacancies" due to death and retirement because of old age would provide opportunities for only 53 per cent of the men reaching 25 according to estimates. There was considerable variation in replacement rates in the various counties studied (table 3).

This study concludes that, for the United States as a whole, the heavy migration from the farm population since 1940 has in-

[8] Hoglund, C. R., Postwar Farming Adjustments and Opportunities in South Dakota, South Dakota Agricultural Experiment Station.

[9] Replacement rate: Assuming no migration and constant mortality rate, the number of men in the rural-farm population who would reach their 25th birthday for every 100 men, 25–69 years old in 1940, who would have reached age 70 or would have died.

TABLE 3. DISTRIBUTION OF COUNTIES BY REPLACEMENT RATES FOR RURAL-FARM MALES AGED 25–69, NORTHERN GREAT PLAINS STATES, 1940–50

Replacement rate	Distribution of counties	
	Number	*Percent*
Under 100	7	1.5
100 to 149	173	37.5
150 to 199	202	43.9
200 to 249	61	13.2
250 to 299	9	2.0
300 to 349	6	1.3
350 to 399	2	.4
400 and over	1	.2

Source: "Replacement Rates for Rural-Farm Males Aged 25–69 Years, by Counties, 1940–50," Conrad Taeuber, BAE, USDA, Washington, D. C., Dec. 1944.

volved older people as well as the young people who usually supply most of the migrants. The preference of the armed forces for young men has involved a particularly heavy loss of men who were 15 to 24 years old in 1940. In spite of the great decrease in the number of these young men since 1940, there are still enough left on farms to fill "vacancies" which are likely to result from death or retirement of older men living on farms during the decade 1944–54.[10]

The plans of many families to turn over their farms to sons who are in the armed services will necessarily mean increased migration of other farm boys because of the limited number of vacancies in relation to potential farm operators.

Closer Settlement in Developed Land Areas

Most of the land in the Plains was homesteaded in 160 and 320 acre units. Subsequent developments have indicated that in most parts of the area this size is too small for an economic farm unit. Consequently, a process of combination of farm and ownership units has been going on since homesteading days. This process has been given added impetus by drought and by technological improvements that enabled one man to handle more land. The war may have slowed down this trend but has not reversed it. Machinery production has been restricted, but the number of farms having tractors and accompanying equipment has increased. The labor shortage has stimulated the development of many labor-saving devices that will be generally available after the war. It is certain that the amount of cropland one man can handle will increase

[10] Taeuber, Conrad "Replacement Rates for Rural-Farm Males Aged 25–69 Years, by Counties, 1940–50," Bureau of Agricultural Economics, December 1944.

through both further mechanization and improvement in equipment. Some progress will be made in reducing the labor required in handling livestock. The net result will be a tendency to hold the present high production per worker and to gradually increase it.

As there are still a number of small farm units in the Plains it can be expected that the trend will be to increase the size of farms after the war. Subdivision and closer settlement would be going against this trend and its effect would be offset by consolidation of other farms.

Indications are that there will be some voluntary subdivision by individual farmers. Some units are large enough to permit dividing into two or more family-sized units, but the subdivision of smaller farms might mean inadequate units for all concerned. The level of land prices at the time of subdivision will be very important because a higher overhead for buildings and machinery will have to be carried by the smaller farms. It seems very doubtful that a net increase in number of farm opportunities will occur through subdivision.

Land in military sites.—About 667,000 acres of land were purchased by the War Department from private owners in this region from July 1, 1940 to October 1, 1943.[11] An additional 22,000 acres were transferred from other federal agencies. This land was acquired for military camps, airfields, storage depots, ordnance plants, gunnery ranges, internment camps and other military installations. Most of the acquisitions by the War Department are in Kansas, Colorado, Nebraska and South Dakota, with only a small acreage in Montana and Wyoming, and none in North Dakota. Of the 667,000 acres bought from private owners, 282,000 acres or 42 percent were cropland, 330,000 acres were grazing land, 1,000 acres were forest land, and 53,000 acres were waste or miscellaneous land.

The land in these sites has been altered for military purposes, and most of the farm buildings and farm improvements have been removed. Factories, concrete runways, storage igloos and barracks have been constructed. Meanwhile grading the land and digging foxholes and trenches have mixed subsoil with the topsoil. These modifications have affected about 119,000 acres.

The future possible agricultural use of this land in military sites, if it is returned to agricultural use, is as follows: Without expensive rehabilitation, about 225,000 acres would be suitable for cropping,

[11] The discussion does not include any analysis of about 50,000 acres purchased by the Navy Department.

332,000 acres for grazing, and 900 acres for forestry, while 110,000 acres would be covered by heavy construction or would be otherwise unfit for agricultural use.[12]

No information is available as to the amount of land that will be declared surplus and returned to agricultural use after the war. It seems probable, however, that some of the land will be retained for military establishments, some will be used for industrial purposes, and some of the airfields will be used for commercial aviation. If all of the land in military sites which is now suitable for agricultural use were subdivided into adequate family-size units, it would furnish about 1,000 settlement opportunities.

Settlement on other public lands.—There is an estimated 123 million acres of other public lands in the region. Several suggestions have appeared in the press that these public lands be made available for settlement. An examination of the character of these lands and the use to which they are now being put indicates that very little of this public land is suitable or available for settlement.

The kinds and amounts of public ownership in the seven States are estimated as follows:

Kind of public ownership	*Millions of acres*
Federally-owned or controlled:	
National parks and monuments	4
Wild life projects	1
National forests	41
Indian reservations	16
Land Utilization projects (SCS)	4
Federal grazing districts	25
Public domain outside of grazing districts	6
Total federally-owned (except military land)	97
State ownership:	
School and endowment lands	18
State credit agencies	2
Total state ownership	20
County ownership:	6
Total public ownership	123

The national parks, monuments, wild life projects, and forests were reserved or acquired because of their high public values for recreation and watershed protection. These areas probably contain scattered tracts that are suitable for farming, but it is generally believed that the public values would be injured by allowing such

[12] Disposition of Surplus Property, No. 1, Hearings before the Subcommittee of the Committee on Public Buildings and Grounds, House of Representatives, 78th Congress, Second Session, Government Printing Office, Washington, D. C., 1944.

private use. A considerable area of the forest lands are now used for controlled grazing. In the postwar period it may be expected that more land in the region may be needed for public recreation.

Federal policy during the past decade in regard to Indian reservations has been to withhold these lands from white settlement and to repurchase some lands formerly opened to homesteading, so that land will be available for the expanding Indian population.

The purpose of the Federal Land Utilization project was to retire submarginal cropland and operating units, and to readjust population in line with available resources. The lands acquired are now being used for grazing by local ranchers and farmers.

Practically all of the public domain, both within and outside of grazing districts, is either grazing or waste land. These lands were open to homesteading until 1934, but were not settled because they can be used successfully only in large blocks and not enough acreage could be acquired under the homestead laws to establish a ranch unit. Most of these lands have a low grazing capacity.

State school endowment lands are for sale in all States except Nebraska at minimum price of $5 or $10 an acre. These lands have been offered over a long period. Those remaining are generally grazing or cropland tracts that were not considered worth the minimum price; they are not all leased but are generally used by local operators. In most cases they must be combined with other land for economical operation. Nebraska has discontinued the sale of State school lands and in Kansas practically all of it has been sold.

The lands owned by the State credit agencies and counties are for sale, but they are mostly scattered fields and small tracts of grazing land. Much of this land has been leased and sold to local operators; it is one phase of the ownership adjustment that has taken place in the last few years. As most of this land is now in operating units, it offers little in the way of a net increase in settlement.

Settlement opportunities through irrigation.—Agricultural resources of the region can be increased through the development of irrigation. From the standpoint of national investment in the welfare of the Plains, it would appear to be sound policy to develop irrigation in such a way as to reduce public and private costs in time of drought. These costs are high. For example, it has been estimated that Federal expenditures alone in the 1930's were about equal to the cost of proposed developments. A large share of these expenditures were the result of drought.

A survey of irrigation proposals by the Bureau of Agricultural Economics[13] indicates that about 6,265,000 acres of new land has been proposed for irrigation in the Northern Plains States. About 4,176,000 acres of this is included in the proposed development of the Missouri River Basin and is partially authorized by Congress.[14] However, not all this acreage will be developed in the immediate postwar period. The BAE survey estimates that about 349,000 acres are now authorized or feasible for development and actual settlement in the first five years after the war. An additional 228,000 acres might be developed, but either information was not available to determine feasibility or the costs appeared to be excessive.

The Bureau of Reclamation has submitted a postwar program to Congress involving 2,207,000 acres in the Northern Plains.[15] The construction period for these developments range from 1 to 10 years, but the Bureau estimates that the construction could be completed for 1,854,000 acres in 5 years.

Taking the Bureau of Reclamation's program of construction as submitted to Congress and applying the farm development experience on 9 of the existing Reclamation projects in the region, the expected annual increase in irrigated land may be estimated. The experience on existing projects has been used to construct a curve showing the percentage of irrigable land that would be irrigated each year during the first 20 years of the development. Applying this percentage to the proposed postwar program, it is found that while construction would be completed on 1,825,000 acres by the fifth year, only 413,000 acres would be under irrigation. At the end of the tenth year, construction would be completed on 2,207,000 acres but 940,000, less than one-half, would be irrigated. Assuming no additional construction, 1,215,000 acres would be irrigated at the end of the fifteenth year. At the end of the twentieth year, 1,385,000 acres would be irrigated.

If these estimates are valid,[16] then 20 years after the start of the

[13] "A Study of Proposed Irrigation in the Ten Plains States," Bureau of Agricultural Economics, Lincoln, Nebraska, August 1944, unpublished.

[14] H. R. 4485, 78th Congress, 2d Session, December 4, 1944.

[15] Hearings before the Special Committee on Post-War Economic Policy and Planning, U. S. Senate, 78th Congress, S. Res. 102, Part 5 Reclamation, Irrigation and Power Projects, June 6, 1944. These figures are from a Proposed Program and only part of it has been authorized by Congress.

[16] The rate of development has been estimated from a smoothed curve based on 30 year records of existing projects. Curves developed from data on age of irrigation enterprises in the 1920 Census of Irrigation show a similar trend. See also Teele,

program less than two-thirds of the total land for which water would be available will actually be under irrigation. The slow rate is accounted for by farms and other land in the project areas that are not brought under irrigation for some time and by partial irrigation of other farms. Complete irrigation of all irrigable land is never reached. The implication of this rate of development to land settlement is obvious.

The BAE survey indicates that about 2,200 irrigated farms might be made available for settlement in the first 5 years after the war on projects under construction or authorized and in proposals that have been classified as feasible or with only minor limitations. About 16,600 additional farm settlement opportunities might subsequently be made available on this type of project over a long period (table 4).

TABLE 4. ESTIMATED NUMBER OF FARMS WHICH COULD BE MADE AVAILABLE FOR SETTLEMENT THROUGH DEVELOPMENT OF NEW IRRIGATED LAND, NORTHERN GREAT PLAINS

	Estimated time of settlement	
	First 5 years	Subsequent long-time development
	Number of farms	*Number of farms*
I. Projects under construction and authorized, plus feasible proposals and those with minor limitations to feasibility.	2,176	16,619
II. Proposals that lack sufficient data to determine feasibility.	813	16,813
III. Proposals that have major limitations to feasibility.	39	4,943

Source: Unpublished study by Bureau of Agricultural Economics.

A second group of irrigation proposals on which sufficient data were not available to determine feasibility would, if developed, make about 800 farm settlement opportunities in the immediate postwar, and more than 16,000 in subsequent years. Although these estimates indicate that the possibilities of irrigation development are rather large, only a relatively small number of new farms could thus be made available for settlement in the immediate postwar period.

Economics of Reclamation, Chapt. VII. Considerable progress has been made in techniques of land development in recent years, but much of the land proposed for irrigation is in private ownership and now used for dry farming and ranching; many of these operators may not want to irrigate. A program could be devised to speed up the conversion of existing dry farms to irrigation.

There will be considerable variation among States in the extent of future irrigation as well as in the settlement opportunities that may be provided. The irrigated acreage of the Northern Great Plains could be increased greatly, but since the southern and eastern areas are already closely settled, the opportunities for new settlers are fewer than in the less densely settled western and northern areas.

Conclusions

Although it is impossible to predict accurately the agricultural future of any region such as the Northern Great Plains, the indications are that many of the shifts in farm population and number of farms are permanent changes. The agricultural adjustments in the Plains are not completed; additional impact may be expected from further mechanization and from shifts in demand for agricultural products. However, under a postwar situation of full employment and a high level of national income, these adjustments would be relatively painless.

Reemployment of demobilized manpower in the region will be a problem of considerable magnitude, but if suitable alternatives are available, the number seeking to enter or return to agriculture will probably not greatly exceed the number that left to enter the armed services. However, most of those who seek farm opportunities will apparently wish to become farm operators. As the number of opportunities to become farm operators in the region will be limited, they will come into competition with those now operating or working on farms.

Replacement of farm operators who are retiring from the farm labor force seems to offer the greatest number of opportunities. However, many farmers are retiring during the war and there will be competition for places vacated in the postwar period by the large proportion of young men who annually enter the labor force. Subdivision seems to offer little in the way of net opportunities. A small number of opportunities will be available on military land. The public land in the region offers little or no opportunity for establishing new farms and irrigation development will offer relatively little in the immediate postwar period, but it will result in a considerable increase in later years if the proposed projects are developed.

LABOR PRODUCTIVITY IN AGRICULTURE IN USSR AND USA*

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AN OFFICIAL Russian publication[1] used as a slogan the following statement:

"In agriculture instead of an ocean of individual farms with their feeble techniques and domination of the kulak we now have in the all-embracing system of the colchose[2] and sovchose[3] the most concentrated agriculture in the world, mechanized and equipped with modern techniques."

The claim of possessing the most concentrated agriculture in the world is correct with reference to crop production. In 1938 96 percent of the total sown acreage and practically all wild hay and pasture belonged to and was operated by 3961 sovchoses averaging 2091.2 hectares of total land and by 242,400 colchoses averaging 481.6 hectares. In USA, on the other hand, the 1940 census counted 6,094,799 farms; there still remain more than three million commercial farms after part-time, residential, and similar small enterprises are excluded from that figure.

The claim to the most mechanized agriculture in the world, frequently made in USSR,[4] though a gross exaggeration, is correct with reference to such important operations as plowing with the tractor and harvesting small grain with the combine. In 1938 71.5 percent of all spring plowing was performed by tractors in USSR;[5] USA falls short of this figure. 48.4 percent of the acreage in small grains was harvested with the combine in USSR in 1938; in USA 49 percent of the wheat acreage but only 10 percent of the oat acreage was so harvested in the same year.[6]

* The findings presented here agree in substance with those of M. Kubanin ("The Level of Productivity of Labor in Agriculture in USSR and USA," *The Problems of Economics*, 1941, no. 1), whose study came to the attention of the present writer after he had finished this article. In the present article all quoted studies pertaining to USSR are in Russian; translated titles are used without putting them in square brackets.

[1] *Socialist Agriculture in USSR, 1938*, p. 10.

[2] The writer believes it unwise to spell "colchose," the abbreviation for collective farm, with a "k," thus removing from it the direct connection with the word "collective."

[3] Abbreviation for "state farm."

[4] See, for example, N. Sacharov and N. Rudienko, "Demonstration of the Historical Achievements of the Colchose System," *Socialist Agriculture*, August 1939, p. 24.

[5] *Socialist Agriculture in USSR, 1938*, p. 24.

[6] *Farm Wage Rate Index Down 3 Points from Year Ago*, U. S. Department Agriculture, Agriculture Harvesting Service, July 14, 1939, pp. 14–15.

The great concentration of enterprises and the mechanization easily leads one to believe that productivity per farm worker is high in USSR. Large farms commonly spend much less labor per unit of area or product than small farms; mechanization primarily aims at saving of labor. Yet, if one wants to find a productivity of farm labor similar to that in USSR, one has to look to such backward areas as the Danubian countries, excluding Hungary. USSR is greatly inferior as compared with such a country as Germany, although no one would speak of agriculture of this country as greatly mechanized. The difference is even greater in labor productivity between the agriculture of USSR and USA.

In 1938 the population of USA was little more than three-quarters of that of USSR, its farm population was only one-third and the labor force on farms less than one-quarter. The value of the net production of farm products, however, was about one and one-half times larger in USA than USSR. Consequently the productivity per person of farm population in USA was more than four times that in USSR; the difference was still substantially greater in the productivity per person engaged in farm work.

There are several reasons for this huge difference. Compared with agriculture of USA, Russian agriculture is much more poorly equipped with capital, and the available machinery, implements, and livestock are of poorer quality. Owing to the inadequate amount of machinery on farms, it has to be largely used at inappropriate times, when it is less effective. A tremendous amount of work is performed simply by hand. The smallness of the Russian farm horse, the low yield of milk and eggs per cow and hen, the slow maturing of hogs, and so on—all implies a large amount of labor per unit of product.

Another important factor contributing to the relatively low productivity per man in USSR is the Russian peasant's inferiority to the American farmer as a worker and, to an even greater degree, as a manager. The colchose system makes the peasant also very unwilling to work and implies considerable additional input of labor for management, guards, and so on. Of relatively minor significance as far as the present huge difference in productivity of labor in USA and USSR is concerned, but in itself of lasting and very great importance, is the fact that Nature is much less generous to the agricultural producer in USSR than in USA.

Output

The difficulties and limitations encountered when comparing total farm production in two so widely differing countries as USSR and USA are realized, but it is hoped that the comparison is accurate enough for the very broad conclusions drawn from it.

As is shown in Table 1, USSR exceeds the USA in the output of only three major products, potatoes, sugar, and vegetables. Quantitatively the difference is large only in the case of potatoes; and qualitatively the vegetables of USA are much more valuable. Grain production, including potatoes in terms of grain, is about 15 percent larger in USA. Production of vegetable oil in USA exceeds that of USSR by almost one-third. About 60 percent more fibers are produced in USA, and cotton, the chief American product, is more valuable on a pound basis than hemp; in Russia cotton is also more valuable than flax. Fruit production in this country is about $3\frac{1}{2}$ times that of USSR, and the value of the tobacco production is several times higher.

The portion of the crop production which composes part of the net farm output, i.e. that used for food and technical purposes rather than seed and feed, does not bulk as large in USA as compared with USSR as the gross production shown in Table 1, because a much larger proportion of grain is fed in USA than USSR. In fact, the quantity of grain used for food and technical purposes is somewhat smaller in USA than USSR. Several times as many potatoes are used for food and technical purposes in USSR than USA. The smaller USA production of grain, potatoes, and vegetables for food and technical purposes is probably about offset by the much larger fruit production, the larger production of vegetable fibers and vegetable oil, and the much higher value of the vegetables and tobacco in USA.

USA is much superior to USSR in the output of animal products. Three times as many eggs, $2\frac{1}{2}$ times as much of the principal meats (beef, veal, pork, and lamb), almost four times as much poultry, and $1\frac{3}{4}$ times more milk is produced in this country. After milk, meat, and eggs are converted to a uniform basis, the USA production of the major foodstuffs of animal origin appears at least double the USSR production. Hides and skins are produced in greater quantity and of better quality in USA than USSR.

In the total value of the net production of farm production in

TABLE 1. OUTPUT OF MAJOR FARM PRODUCTS IN USSR AND USA AROUND 1938*

Product	Unit	USSR	USA
Grain	million tons	93[a]	125
Vegetable oil	1000 tons	775[b]	1000
Fibers			
Cotton	million bales	3.9[c]	13
Flax	1000 tons	570[d]	
Hemp	1000 tons	410[e]	
Wool	1000 tons	146[f]	185
Total	1000 tons	2100	3400
Sugar	1000 tons	2750[g]	2400[h]
Potatoes			
White	million tons	65[i]	11
Sweet	million tons	—	2
Total	million tons	65	13
Vegetables	million tons	23.0[j]	20[k]
Fruits	million tons	325[l]	11[k]
Meat and lard	million tons	3.6[m]	9.0
Poultry	million tons	0.33[m]	1.2
Milk	million tons	32	52
Eggs	billions	12[n]	37

* Official data, with adjustments as stated in footnotes; for USSR from *Socialist Agriculture USSR in 1938; Socialistic Construction USSR, 1933–38; Statistical Handbook USSR, 1928; Acreages 1938 by Crops and Farm Types;* and other official publications, for USA from *Agricultural Statistics,* published by U. S. Dept. of Agriculture and other official sources. Most figures rounded.

[a] In USSR official crop statistics give yields and production in terms of the "biological" crop, which tend to be substantially higher than the actual or the so-called "barn" crop. Prolonged careful analysis leads to the conclusion that the normal barn yield of grain was about 8¼ quintals per hectare around 1938. The grain acreage was 102.4 million hectares in 1938. The Russian term "grain" includes dry legumes; hence these are included also in the figure for USA.

[b] Computed from data on acreages, probable barn yields, and probable extractions of the various oilseeds.

[c] *Socialist Agriculture USSR in 1938,* p. 66.

[d] Acreage, 2.2 million hectares in 1938; estimated yield, 2.4 quintals per hectare. The preliminary figure for flax-fiber marketed by farmers in 1938/39 (*Socialist Agriculture USSR in 1938,* p. 89) was 370,000 metric tons.

[e] Acreage, 654,000 hectares in 1938; average yield, 5.7 quintals per hectares in 1925–29.

[f] Preliminary official figure for 1938–39, *Socialist Agriculture USSR in 1938,* p. 73.

[g] Official figure for 1938.

[h] Does not include sirups.

[i] Acreage of 1938 times an estimated barn crop of 8 metric tons per hectare.

[j] Average 1925/26 to 1927/28 from *Statistical Handbook USSR, 1928,* pp. 280–81. The total acreage in the two groups of vegetables, which are distinquished by the Russian statistics, was about the same in 1938 and 1928.

[k] Computed from *The National Food Situation,* U. S. Dept. of Agriculture, June 1944, with adjustments for unaccounted portions of the crops.

[l] Average 1925/26 to 1927/28 from *Statistical Handbook USSR, 1928,* pp. 280–81.

[m] Computed from the data on pp. 73 and 75 of *Socialist Agriculture of USSR in 1938.*

[n] The number of chickens as of spring 1938 was the same as that of chickens remaining on farms at the end of the winter 1927/28. The production figure for eggs of 10.8 billion in 1928 was increased to 12 billion to take care of improvements.

USA in 1938, the value of livestock products exceeded that of crops by 47 percent. Using these weights, we arrive at the conclusion that the net production of farm products in USA is more than one and a half times that in USSR. The result is moderately less favorable for USA, if the relative values of the vegetable and animal products in USSR are used as weights; in that country the value of the crops used for food and technical purposes was substantially higher than that of animal products in 1938.

Owing to limited markets and Government action, the prewar agricultural output of USA was considerably below the country's productive capacity. The agriculture of USA was able to increase its output by more than 25 percent from 1938 to 1944, although the supply of labor declined considerably and the supply of new machinery was greatly curtailed. The agriculture of USSR, however, was working full steam before the War, and hence during the War the output fell substantially even in the territory never occupied by the enemy. Thus the *productive capacity* of American agriculture was about twice that of Russian agriculture before the War.

Farm Population and Labor

There were 30.5 million persons on American farms in 1938; the Russian population engaged on farms was around 90 million, i.e. about three times as large.[7] Since the value of the net agricultural production in USA was about one and a half times that in USSR, the output of farm products per person of farm population was more than 4 times larger in USA than in USSR before the War.

The average number of persons employed on American farms in 1938 is officially estimated at 10,740,000. In 1937 40,716,000 collective members were working for their colchoses.[8] The 2.5 million, employed by the sovchoses and by the machine-tractor stations, and some 2.6 million workers in individual peasant house-

[7] According to Varga, a competent observer (*The Journal of the Academy of Sciences of the USSR*, June 1939), the farm population amounted to about 58 percent of the total population at the beginning of 1939, when the latest population census was taken. Since the total was 170.5 million according to the census, the stated percentage indicated an agricultural population of 97.8 million. The term "agriculture" as used by Varga probably included forestry and fishing. Perhaps eight million people depended on these branches. This leaves about 90 million for the population depending on agriculture. The 1939 census counted a rural population of 114.6 million; this figure indicates a population depending on agriculture materially above 90 million.

[8] *Colchoses in the Second Stalin Five-Year Period*, Moscow and Leningrad, 1939, p. 35.

holds, brought the total of gainfully employed in USSR agriculture to 45.8 million.

The data for USA and USSR are not strictly comparable. While the American figure listed only persons employed strictly in agriculture, some collective members were employed in civic activities or in jobs of similar nature. Furthermore the American figure represented mostly full-time employment of adult men; for July 1, 1938, the figure of gainfully employed was estimated at 12,511,000. The Russian figure for the collective members, however, included every person, even if his or her work amounted to only a few days per year. Some workers on collective farms were used for work other than agriculture. Also, more than half of the workers on collective farms consisted of women; to a smaller extent children also were used. But there actually is a great difference in the participation of women and children in farm work in USA and USSR. While women do little farm work in USA in peace time, they contribute a great deal to it in USSR. In 1937, for example, on the investigated collective farms of 28 regions every woman aged 16 to 59 averaged more than 150 days of farm work per year,[9] and the average continued to increase in succeeding years.[10]

Thus the output of farm products per person gainfully employed in agriculture was perhaps five times as large in USA than USSR.

The Land

The analysis of the reasons for the large difference in the productivity per man in USSR and USA is best started with a consideration of land resources. USA is much warmer than USSR. Only a small portion of Russian farm land lies south of 46.5°, the latitude of Odessa, but also of northern Maine. Only southern Russia is sufficiently warm for corn and the areas with sufficient warmth for cotton and peanuts are even more limited; that adequate for citrus fruit is negligible.

Moisture deficiency is another dominating factor in USSR. Rich, black soil stretches over most of southern European Russia and extends far and wide into Siberia. Part of this soil is deeper and richer than the corresponding soils in the western USA. But what of this,

[9] *Productivity and Utilization of Labor in Colchoses in the Second 5-year Period*, Moscow and Leningrad, 1939, pp. 68 and 82.

[10] See I. Merinov "Labor Supplies of Colchoses," *Socialist Agriculture*, March 1941, p. 18.

if, as is the case in the western parts of the Dakotas, Nebraska, and Kansas as well as farther west, insufficient moisture makes it impossible to utilize that richness fully? The areas well supplied with moisture are on the whole greatly superior in soil productivity in USA to the corresponding areas of USSR (central and northern Russia) owing to the much greater amount of warmth and, partly, to better quality of the land. The tremendous asset which the USA possesses in the corn belt, where forty bushel-per-acre corn is obtained with little effort, cannot be overestimated. USSR has nothing comparable not only to the large corn belt with prairie soils but even to the small corn belt with merely forest soils. In the best adapted areas, corn averages only 16 bushels per acre in USSR, while the average yield for the whole USA, including the very unfavorable South, is 23½ bushels. Even the land of eastern and northeastern USA is materially better than the land of central and northern USSR.

The natural land resources of USSR make an especially poor showing, if considered in relation to the population. Much grass land, which owing to insufficient precipitation is used in USA only for sheep grazing, is plowed in USSR, yielding very low returns and failing in three years out of every five. Likewise, a great deal of poor, cut-over forest land, which is not considered worth clearing here, is cultivated in USSR.

The great difference in the quality of the land is obvious from the fact that the much greater crop production of the USA is obtained from approximately the same harvested acreage of arable land as that of USSR; the total crop acreage, i.e. harvested arable land and wild hay is substantially smaller in USA. The greater generosity of Nature is the principal reason for this difference.

The Means of Production

There was less than half a horsepower in animal draft power, tractors, trucks, combines, and stationary motors, per gainfully employed person on collective farms and machine tractor stations in 1937.[11] USA had three horsepower per person gainfully employed in agriculture in tractors and horses alone in 1939. Russia had only 153,800 combines in 1938 for its huge acreage harvested with this machine. It is noteworthy that binders, the standard harvesting machine for small grain in advanced countries are little

[11] *Colchoses in the Second Stalin Five-Year Period, op. cit.*, pp. 29 and 35.

used in USSR. So far as machinery other than the combine was used for harvesting small grain, it was largely the mower which does nothing but cut and has not been used for this purpose here for decades. While only 8.5 per cent of small grain was harvested by hand in 1938, almost half of it was *bound* by hand in that year after having been cut with a mower.

There is even less equipment for all other operations such as cultivating, haying, preparing silage and other kinds of feed, procuring water, sawing wood, and so on. Most of these operations indeed have to be performed entirely by hand. The Russian machinery is not up to date. For example, rubber tires, which became standard equipment of wheel tractors in this country several years ago, are not yet used in USSR. The Russian machinery is also not as well built and not as durable as the machinery in USA. The poorer and less up-to-date machinery is further impaired in its usefulness by poor repair facilities as well as by the use of machinery which here would be considered to have finished its useful life.

The quality of the livestock leaves even more to be desired than that of machinery in the USSR. The small horse predominates in USSR; and although it is very modest in its feed requirements, it works accordingly. The 64 percent higher milk production in USA is attained with practically the same number of cows as in USSR (23.3 million in USA and 22.7 milion in USSR in 1938). A 30 percent larger number of cattle (65.2 million in USA and 50.9 million in USSR in 1938) produced more than twice as much beef and veal (3.95 million tons in USA and about 1.65 million tons in USSR) and of better quality at that.

Slightly less than a half as much fertilizer was used in USSR than USA in 1938.

The Man

The Russian peasants, now mostly colchose members, have had little, if any, schooling. They are making very little and their reward, moreover, is very uncertain.[12] Hence their living quarters are not much better than the accommodations of well-kept animals. The diet is among the worst in the world, consisting almost exclusively of bread, and even of this they rarely can afford to eat all they

[12] The colchose members get a share in the proceeds of their collective farms only after the obligatory delivery to the government has been made, the machine-tractor stations have been paid, and the funds for seed and feed have been set aside. In poor crop years little or nothing is left for distribution among colchoses members.

want. The unwillingness of the collective members to work for the very low and uncertain reward also undoubtedly bulks large among the factors which bring about the low productivity of labor. Such workers certainly are no match for the American farmer in all-round intelligence, ability to do continuous work without overstraining themselves, and especially in skill of handling machines. But, owing to the very low cost of labor of the colchose members, there is also no reason to economize on it. Labor indeed is by far the cheapest factor of production of collective farms.

Pictures are frequently seen in magazines and other publications which show the gigantic progress in the mechanization of agriculture in USSR; harvesting with the combine is displayed most proudly, sometimes even with such huge aggregates as two 20-foot combines driven by one 60-horsepower crawler. A careful observer of these pictures will notice that there are two men on each tractor and four men or more on each combine. For several reasons, the six men on the tractor and combine in USSR do not do as much work as two men on the same outfit in USA. Yet tractor drivers and especially combine operators are the cream of what the USSR village can yield. These newly created village aristocrats are making 3 to 4 times as much as ordinary colchose members;[13] they live better than most "kulaks" used to live and certainly are far superior to the average colchose members in intelligence and ability to perform. The efficiency of the American farmers exceeds that of Russian colchose members in most other operations, for example, in harvesting corn or milking cows, much more than in driving tractors or operating combines. Owing to the very low cost of labor, huge amounts of it are used for operations, which are uncommon not only in USA, but in most European countries as well, such as repeated hand-weeding of small grain or repeated hand picking of heads of small grain left in the field.

There is much in the system of collectivized farming besides the very low reward of colchose members which operate toward inefficiency in general and labor inefficiency specifically, such as the separation of the ownership of the machinery from its users, the

[13] The workers of machine-tractor stations which are paid by the colchoses—these mostly consist of tractor drivers—averaged 3.8 "working days" (a unit in which the share of the members in the returns of their colchoses is computed) per day of work on the investigated collective farms in 1937, while all men from 16 to 60, except the tractor drivers, averaged 1.4 "working days" per day of work. In addition to the "working days" tractor drivers were given substantial special bonuses in products obtained from fields on which they worked.

collective farms; the excessive size of many machine-tractor stations; too large size of many colchoses; too much emphasis on the biggest sizes of tractors and combines; the use of the combine in areas and under conditions unadapted for this form of harvesting; the large number of operations which are not performed by the machine-tractor stations and also can not be done efficiently by the colchoses themselves, such as haying. The topic is too broad to be discussed here.

Individual enterprises.—Table 2 gives a comparison of the findings of investigations specifically undertaken by official agencies in USSR and USA to determine the labor input. In using the data it is necessary to consider that in the USA study the labor is mostly that of adult men, while in the USSR study the work of men, women, and, to a small extent, even children is involved. Milking of cows, for example, is definitely woman's work in USSR. On the other hand, only the immediate supervision such as that of the superintendent of the dairy branch is included in the analysis for USSR. The time spent for general management, bookkeeping, and so on, is not assessed to individual crops and livestock. Likewise unassessed is the time spent by the personnel of the machine-tractor stations. In USA, however, the farmer usually is his own manager, while bookkeeping, if done at all, is a spare-time occupation.

Small grains.—Three to four times more labor is spent per hectare of small grain in USSR than in USA, if the labor provided by the owners of the hired threshing machines is added to the figures shown in the table for USA. The lowest figure given in the USSR source is 2.7 days per acre of early spring grain in the Azov-Black Sea region. All but 4.1 percent of the plowing was done by tractors and 65.2 percent of the acreage was harvested with the combine in this region in 1937. For Nebraska, where all the wheat is fall-sown (fall-sown grain requires somewhat more work than spring-sown small grain) and only 51 percent of the wheat acreage was harvested with the combine, the USA source gave 5.7 hours of labor per acre of wheat. Almost as much (5.2 hours) was spent in the Azov-Black Sea region on hand weeding alone. Even more time (5.1 hours in Rostov oblast and 8.1 hours in Krasnodar oblast[14]) was used for "other harvesting work," of which hand picking of heads remaining in the fields probably constituted a large part.

[14] Data from p. 31 of the quoted study; only two oblasts were investigated in the Azov-Black Sea Region.

TABLE 2. LABOR INPUT ON SPECIFIED CROPS AND LIVESTOCK ON COLLECTIVE FARMS OF USSR AND ON AVERAGE FARMS OF USA IN DAYS*
(Per Acre; on Livestock Per Year)

Item	USSR	USA
Fall sown small grains	4.74	—
"Early" spring grains; i.e. wheat, barley, and oats	3.95	—
Millet	4.96	—
Wheat	—	0.87[a]
Rye	—	0.99[a]
Barley	—	0.96[a]
Oats	—	0.90[a]
Corn	6.26	—
Harvested from standing stalks	—	2.42
Cut, shocked, and husked	—	3.63
Cotton	33.10	9.10
Sugar beets	53.38	9.20
Potatoes, white	26.74	6.80
Cows	46.00	14.00
Milk, per 100 pounds	1.89	0.30
Heifers and young bullocks	24.00	—
Calves	23.00	—
Beef Cows	—	2.30
Adult Hogs	22.00	—
Young Hogs	17.00	—
Piglets	11.10	—
Hogs, per 100 pounds of live weight	—	0.39
Sheep	4.00	0.62[b]
Lambs	3.00	—

* The figures for USSR from *Productivity and Utilization of Labor in Colchoses in the Second Five-Year Period*, Central Office of Economic Statistics, Moscow and Leningrad, 1939. The figures for USA are from M. R. Cooper and others, *Labor Requirements for Crops and Livestock*, U. S. Department of Agriculture, Washington, 1943. The USA source gives the figures in hours; they are converted to a day basis by assuming 10 hours per day.

[a] The labor on threshing supplied by the owners of the stationary threshing machines not included.

[b] Includes care of lambs until weaning time.

Corn—An American reader will be particularly interested to know how in USSR they manage to spend $6\frac{1}{4}$ days on an acre of corn yielding only 16 bushels,[15] or about 4 hours per bushel. For one thing, they are unable to keep their standing corn sufficiently clean by machinery alone; not less than 2.6 days per acre was spent for weeding and thinning the corn by hand. In 1937 77.6 percent of the corn was harvested by hand at an input of 1.7 days per acre or more than an hour per bushel. Women still pick the corn into aprons and carry it substantial distances. There is furthermore in the corn account an item "other work in harvesting"

[15] Average yield in 1925/29.

with an average outlay of 1.3 days per acre; this probably includes harvesting of the stalks and repeated picking of cobs left in the field in the first picking. In the twenties corn was officially declared the solution of many Russian problems; a persistent country-wide propaganda brought an increase of the corn acreage from 2.5 million hectares in 1924–1925 to 4.5 million in 1928. Collectivization was accompanied by a decline of the corn acreage to only 2.6 million hectares in 1938.

Cotton—Cotton growing with its extremely small reward of labor is a sore spot in the American economy. But it does not make a poor showing as compared with the situation in USSR. The data for USSR in Table 2 pertains only to unirrigated cotton grown in southern European Russia.[16] The yields are low owing to low precipitation and generally unsuitable climatic conditions.[17] But the very fact of the low precipitation should tend to keep the labor input down. In spite of this the labor input on unirrigated cotton in USSR is almost 4 times larger than the average input in USA.

The comparisons of the input of labor on cotton on collective farms specifically with that on farms in the old South[18] shows that, no matter how cheap labor may be in the American South, it is spent even more lavishly, indeed wastefully, in the agriculture of USSR.[19]

Animal products—A milk maid on the average takes care of 6.7 cows, 1.6 heifers, and 1.7 calves in dairy branches of collective farms and she by no means does all the work these animals require; in addition there are shepherds, barn workers, superintendents of the specific branch, and so on. All these additional workers spent 17.7 days per cow and per year in addition to 28.3 days spent by the milk maid, with a total of 46 days. Since the yield of milk per cow was only 2500 pounds in 1937, more than six times more labor was used per 100 pounds of milk in USSR than USA.

[16] In six investigated colchoses of Central Asia, an average of 101 days was used per acre of irrigated cotton in 1939 as against 38 days on unirrigated cotton in1937 as shown in Table 2. See N. Sapeljnikov, "Labor Productivity on Cotton Farms," *Socialist Agriculture*, Oct. 1940.

[17] The average yield on the investigated farms in 1937 was given at 775 kilograms of unginned cotton per hectare or 240 pounds of ginned cotton per acre. But this obviously is the "biological yield," the actual yield must have been much smaller. 1937, moreover, was a year with exceptionally high yields. The average yield is likely to be 120 pounds or little more.

[18] See, for example, A. D. McNair, Labor Requirements of Arkansas Crops, U. S. Dept. of Agriculture Bulletin 1181, Washington, 1924. p. 10.

[19] The Arkansas farms reported on by McNair, used per acre of cotton only about 30 percent of the labor spent on unirrigated cotton by the colchoses of USSR.

The figures on pork production are even more striking. There was one superintendent for each 23.6 hogs, 25.8 young hogs and 39.3 piglets on the investigated collective farms;[20] in some other countries a man would have taken care of all those hogs with no other help and would also have been available for other work. The total yearly input of labor in the colchoses was equivalent to 20.7 days per hog, 16.7 days per young hog (4 to 9 months old), and 11.2 days per piglet. These figures indicate the huge amount of perhaps 7 days per 100 pounds of hogs (live weight) as against 3.2 hours, the average for the American farms.

The American source (p. 128) gives an average of 1.7 hours per chicken and per year and 0.3 hours per chick raised for flock replacement and for meat (6 months). Hence a man fully occupied with chickens is able to handle some 1500 chickens with the necessary flock replacement. A special study of labor organization on chicken branches of collective farms in USSR[21] gives as the recommended norms of work 500 to 700 chickens per chicken woman and 1,000 chicks per chick woman, and these workers again are not expected to perform all the work on their charges. Among examples of well organized chicken branches of colchoses, the author cites a chicken branch of the colchose "The Ray of Light," with 1400 chickens and 5,000 chicks. According to American norms, this poultry would require 3890 hours per year or little more than one full person. The particular branch in USSR had a personnel of 7: One superintendent, 2 chicken women, 3 chick women, and one guard; moreover, the author may have neglected to mention the work on the chickens of those not exclusively occupied in the branch. The second exemplary chicken branch of a colchose described by the author had a personnel of 11 for 2765 chickens and around 5,000 chicks. The same author says "In conditions of the Moscow, Kalinin, and Tula oblasts where the chicken branches are commonly small (100 to 300 animals) only one worker is assigned to the branch. During the breeding period he is given an adolescent as an assistant." In USA many a college student takes care of as many chickens in his or her spare time. Since the chickens owned by the collective farms lay far fewer eggs than the average

[20] The figures were for pasture time; the total number cared for was lower during barn time.

[21] "Organization of Chicken Farms in Colchoses," *Socialistic Agriculture*, 1940, 8–9.

for USA, the labor input per 100 eggs is probably 10 times greater in USSR.

Labor Productivity on State Farms. The productivity of labor is also low on the Russian state farms as compared with the standards of USA and many other countries. Sovchoses devoted to sheep raising produced an average of 378 pounds of wool per all-year worker in 1937; correspondingly sovchoses devoted to hog breeding delivered to the state only 1562 pounds of hogs (live weight) per all-year worker.[22] According to American standards,[23] to produce this amount of hogs a total of one month of labor would be needed (61 hours directly on hogs and 180 hours to grow 5.5 acres of corn for their feed).

[22] *Socialist Agriculture USSR in 1938*, p. 37. The figures in the text pertain to workers in the narrow sense, i.e., they do not include employees.

[23] Cooper and others, *op. cit.*

INTERTERRITORIAL FREIGHT RATE DIFFERENCES IN RELATION TO THE REGIONALIZATION OF INDUSTRY

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IN THE United States, the rail freight rate structure is characterized by a very large number of rate differences, not consistent with cost differences, which exist as between classes, commodities, hauls, and areas. Most of these rate differences have been made by design, either by voluntary action of the carriers or by decisions of the regulatory agencies acting under the authority of the statutes and the guidance of the courts. A large number of these rate differentials have not been litigated and must be considered to be lawful until such time as they are found to be unlawful by the regulatory agencies. Numerous rate differences, however, have been attacked in the past and a significant proportion of them, after formal proceedings, have been found to be unlawful by the regulatory agencies. Lawful rates have then been prescribed, but the differences, though lessened, have not necessarily been eliminated. The bulk of the class rates of the United States and many of the commodity rates have been reviewed or determined by the Interstate Commerce Commission in various proceedings.

Rate-making processes have not given universal satisfaction, as there is no formula by which the correctness of rate differences may readily be determined. The interterritorial freight rate differences, towards which attention is directed in this paper, have caused great controversy, probably more than any other type of rate difference.[1] The southern Governors, the Tennessee Valley Authority, and certain industrial groups in the South and the Southwest have taken a leading part in agitating the question. The southern Governors have already carried the case to the Interstate Commerce Commission and have secured rate adjustments on perhaps a score of manufactured products which are shipped northward in competition with similar products produced in the East.[2] The Tennessee

[1] For the purposes of this paper, the term "rate differences" seems preferable to "rate discriminations," the latter conveying the meaning of unjust or undue discriminations to the minds of many persons. By using "differences," the author hopes to avoid giving the impression that rate differences which do not conform to cost differences are necessarily unethical or illegal.

[2] 235 I.C.C. 255 and 237 I.C.C. 515.

Valley Authority has published three reports on the subject of interterritorial rates since 1937.[3] The Board of Investigation and Research, a temporary agency created under the provisions of the Transportation Act of 1940, has also published a comprehensive report on interterritorial freight rate differences.[4] The Interstate Commerce Commission is presently engaged in an investigation of freight classifications throughout the country and of class rates in the area east of the Rocky Mountains.[5] These proceedings were initiated by the Commission upon its own motion in 1939.

The major issue today in the interterritorial freight-rate controversy is whether the freight classifications shall be made uniform and the class-rate scales equalized or more nearly equalized, distance considered, than they are at the present time. The industrial shippers, actual or potential, and their supporters in the higher-rated territories outside the East generally favor equalization; the industrial shippers in the East and the railroads throughout the country are opposed to such an adjustment. The western and southern proponents of equalization complain that they are discriminated against in their efforts to develop manufacturing enterprises because of difficulties in selling in eastern markets in competition with eastern manufacturers who have the advantage of lower freight rates. Western and southern railroads admit that class rates in their territories are higher than those in the East, but claim that their rate structures, though different than that in the East, have been developed through long experience to meet their peculiar traffic needs and should not be disturbed. The carriers assert that any general reduction in class rates applicable to manufactured products would reduce their earnings and the losses might have to be made up by increases in the rates, which they claim are low, on their primary commodities, such as agricultural products, lumber, coal, and the like.

Farm groups have been in some doubt as to the position they should take in the controversy. As buyers of manufactured prod-

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[3] See Tennessee Valley Authority, *The Interterritorial Freight Rate Problem of the United States*, House Document No. 264, 75th Cong., 1st sess., 1937; also by the same agency, *Supplemental Phases of the Interterritorial Freight Rate Problem of the United States*, House Document No. 271, 76th Cong., 1st sess., 1939, and *Regionalized Freight Rates: Barrier to National Productiveness*, House Document No. 137, 78th Cong., 1st sess., 1943.

[4] Board of Investigation and Research, *Report on Interterritorial Freight Rates*, House Document No. 303, 78th Cong., 1st sess., 1943.

[5] I.C.C. Dockets Nos. 28300 and 28310.

ucts for living and production, they can see the advantages of lower freight rates. Also, they welcome the development of local enterprises, with the accompanying increase of purchasing power in the hands of employees, as an outlet for their products and surplus farm labor. But they are concerned about the railroad claim that lower class rates may make it necessary to raise commodity rates, which govern the movement of most southern and western agricultural traffic.

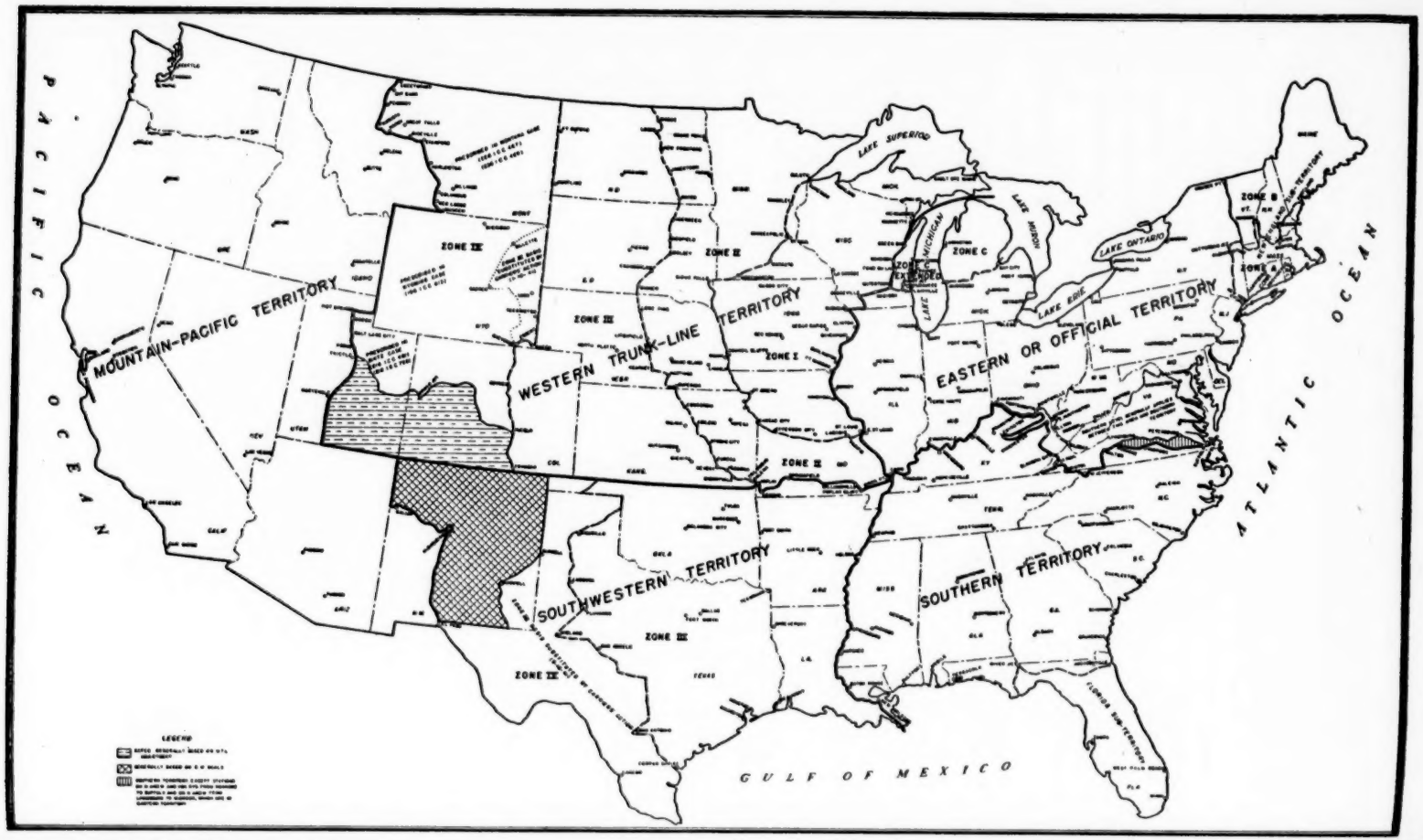
In the discussion which follows, the purpose is to clarify the issues, to present the ascertainable facts about interterritorial rate differences, to trace the effects of such rate differences on regionalization of industry, and to evaluate the various methods proposed for the elimination or reduction of interterritorial rate differences.

Intraterritorial Class Rates

The rate structure of this country has not developed into a complete, unified system, functioning for national purposes in an economic sense; it is characterized rather by regionalization, especially in class rates, even though science and engineering long ago overcame the physical barriers that originally prevented an integration and unification of railroad service. The Interstate Commerce Commission in the last decade or two has taken steps to place the rates that grew up in a topsy-turvy manner on a mord consistent basis, but, although rates are made with greater regard for distance than they used to be, many inconsistencies remain.

At the present time, the major class-rate territories of the United States are Official or Eastern; Southern; Western Trunk-Line; Southwestern; and Mountain-Pacific. (See Chart 1.) Official Territory is divided into three main sub-territories, including New England, Trunk-Line (roughly the area between the Buffalo-Pittsburgh line and New England), and Central Freight Association (the area west of Trunk-Line Territory). Western Trunk-Line Territory is divided into four zones, with a rising level of rates from east to west. The railroads in Eastern, Southern, and Western (Western Trunk-Line, Southwestern and Mountain-Pacific) territories have formed themselves into groups and have developed different policies with respect to the system of charges to be levied against the movement of freight in their respective territories. Instead of having, therefore, a unified freight-rate structure to correspond with integrated service, the Nation has a composite of

CHART 1. RAIL CLASS-RATE TERRITORIES IN THE UNITED STATES, 1942.



territorial structures which often do not fit together properly, largely because of marked territorial differences in both the level and construction of the rates.

First-class rate scales now occupy a basic position in each of the several intraterritorial freight-rate structures.[6] All other class-rate scales are specifically related to the first-class scales by percentages. For example, fifth-class rates are 45 percent of first-class rates in Southern Territory. There is also some tendency in the making of commodity-rate scales to relate them to first class by fixed percentages (sometimes called column rates). This practice serves to augment the importance of first-class rates, since so many other rate scales are directly related to them.

Standard class rates move about 4.1 percent of the carload traffic of the country, according to an analysis made by the staff of the Interstate Commerce Commission of the carload traffic originating on all railroads on September 23, 1942. This class-rate traffic yielded about 6.3 percent of the revenues from carload shipments on that date. With the addition of carloads shipped on exceptions to classification to class-rate traffic, the rates moved about 14.8 percent of the carloads and returned approximately 22.4 percent of the carload revenue on September 23, 1942. The remaining 85.2 percent of the carloads and 77.6 percent of the carload revenue represented commodity-rate traffic.[7] Carload tonnage in 1939 was about 98.3 percent of total rail tonnage, including less-than-carload shipments. If it is assumed that all less-than-carload tonnage moves on class rates, which overstates the amount, and that the small sample is typical of the annual shipments, class rates normally account for about 3.6 percent of the rail tonnage originating and 11.4 percent of the freight revenues. The proportion of

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[6] Class rates are rates subject to the rating provisions of the controlling freight classification. Classification ratings are the symbols which designate the class to which an article is assigned for the purpose of applying class rates. The major freight classification territories in the United States are: Official, comprising roughly the area north of the Ohio and Potomac Rivers and east of Lake Michigan and a line drawn between Chicago and St. Louis; Southern, the area south of Official Classification Territory and east of the Mississippi River; and Western, the remaining area of the United States. These three classifications are published in a single volume called Consolidated Freight Classification, which also contains rules and regulations governing freight transportation service. Class rates may be contrasted with commodity rates, which apply in case a commodity rather than a class is specified. In effect, this practice takes the commodity out of the classification to the extent that the commodity rate applies.

[7] See Exhibit 228 in I.C.C. Docket No. 28300.

traffic involved in the controversy over interterritorial class rates is thus seen to be small.

Intraterritorial Class-Rate Levels

Class rates exhibit six significant differences as between territories. One difference is in the number of regular or standard classes. There are 7 classes in Official, 12 in Southern, and 10 in Western Territory. Another difference is in the classification ratings on commodities. An article may be rated first class in one territory and second class in another, etc. There are also differences between territories in the number and importance of the exceptions to classification rules and ratings.[8] The levels of the first-class scales vary from territory to territory, and in some instances the percentage relationships of lower classes to first class are not uniform as between territories. Finally, different rates of progression of scales are employed in the various territories as distance increases. These complications make it difficult to compute wholly satisfactory indexes of class-rate levels.

Index numbers of the levels of first-class rates and all class rates, including classification and exceptions' ratings, are presented in Table 1. While the indexes of all class rates in the various terri-

TABLE 1. INDEX NUMBERS OF LEVELS OF FIRST-CLASS RATES AND OF ALL CLASS RATES, TAKING INTO CONSIDERATION CLASSIFICATION AND EXCEPTIONS' RATINGS, IN THE VARIOUS RATE TERRITORIES OF THE UNITED STATES
(Official Territory = 100)

Territory	First-class rates	All class rates
Official or Eastern	100	100
Southern	139	133
Western Trunk-Line, Zone I	128	127
Western Trunk-Line, Zone II	146	145
Western Trunk-Line, Zone III	161	160
Western Trunk-Line, Zone IV	184	183
Southwestern	161	153

Source: Board of Investigation and Research. *Report on Interterritorial Freigh Rates*, 1943, p. 56.

tories are somewhat lower than first-class rates as related to the Eastern or Official level, it is clear that the levels of class rates, however measured, are much higher in all other territories than in

[8] "Exceptions" are used to modify the rules of the Consolidated Freight Classification and the ratings of the three major freight classifications. Exceptions' ratings are published in tariffs, generally for the purpose of lowering rates or liberalizing the rules which govern the movement of traffic.

Official. The least difference is in Western Trunk-Line Territory, Zone I, where the rates are 27 percent higher than those in Official. Southern rates are 33 percent higher than Official rates; Western Trunk-Line, Zone II, rates are 45 percent higher; Southwestern rates are 53 percent higher; Western Trunk-Line, Zone III, rates are 60 percent higher; and Western Trunk-Line, Zone IV, rates are 83 percent higher. No index is shown for the rates in Mountain-Pacific Territory because of lack of a consistent class-rate structure in that territory.

Intraterritorial Commodity-Rate Levels

It is practically impossible to determine average commodity-rate levels, either within territories or between territories. Some commodity rates are directly related to class rates by percentage relationships to first-class or other class rates, and are known as "column" rates. Other commodity rates, while not related to class rates, are built upon some consistent basis, such as a distance scale. Still other commodity rates are constructed on a point-to-point basis, and are designed to fit the needs of individual shippers or communities, or to meet a competitive situation. Commodity rates are usually associated with higher minimum carload weights than those associated with classification or exceptions' ratings. Commodity rates are special rates which apply on a designated commodity or group of commodities. They are lower than the class rates they supersede, and some commodity rates are lower than the lowest of class rates. Competition plays a larger role in determining commodity than class rates.

Regional differences in commodity-rate levels may be compared on particular commodities. Studies made by the Board of Investigation and Research show that, on many important commodities, the rates are higher in the South and West than in Official Territory. Examples are salt, plaster, plasterboard, livestock, packinghouse products, cotton textiles, and cement. On some commodities, however, including brick and clay products, fertilizer and fertilizer materials, lime, logs, pulpwood, and scrap iron, the Board found the rate levels to be lower in the South or West, chiefly in the South, than in Official Territory. On coke and sugar, the rates in Official and Southern territories are approximately equal.[9] The Board con-

[9] Board of Investigation and Research, *Report on Interterritorial Freight Rates*, 1943, Chapter IV.

cluded that commodity rates in the South and West, while probably higher on the average than in Official Territory, show less discrepancy than the respective class rates in the same territories. The Board did not, however, undertake to compute index numbers of these regional commodity-rate levels.

Intraterritorial Average Rate Levels

If possible, the average levels of regional rates, including class and commodity rates, should be determined for comparative purposes. The measure of average rates most often employed, *viz.*, average revenue per ton-mile, is rather unsatisfactory because it fails to allow for variations in the composition of traffic and in the average length of hauls that may exist from area to area. In this country, rates are usually less per mile for long hauls than for short hauls, sometimes much less as when the rates are blanketed or grouped as to points of origin or destination over wide areas. It is necessary to state the average length of haul when making rate comparisons on the basis of average revenue per ton-mile; even when this is done, it is difficult to make proper allowance for the differences in average hauls.

Average revenues per ton-mile for the principal regions or districts are shown in Table 2. Taken at their face value, the data indi-

TABLE 2. AVERAGE REVENUE PER TON-MILE, CLASS I LINE HAUL RAILROADS, BY REGIONS OR DISTRICTS, 1939

District or Region	Average revenue per ton-mile (mills)	Index, Eastern = 100
Eastern District	10.07	100.0
Pocahontas Region	6.42	63.8
Southern Region	10.01	99.4
Western District	10.21	101.4

Source: Interstate Commerce Commission, *Statistics of Railways in the United States*, 1939.

cate that the average level of rates in the Southern Region is slightly below the level in the Eastern District and only a little higher in the Western District than in the Eastern District. The sole important departure from the Eastern level occurs in the Pocahontas Region, where the average rates are low because of the preponderance of bituminous coal in the traffic. As for Southern and Western territories, the indexes do not square with the known

facts about class rates, or even commodity rates. It is necessary, therefore, to subject the average revenue data to further treatment if they are to be useful as a measure of rate levels. It is known that the average haul is longer in the South than in the East, and longer in the West than in the South. The Bureau of Transport Economics and Statistics of the Interstate Commerce Commission estimates that the average haul per shipment in 1939 was as follows: Eastern, 252 miles; Southern, 282 miles; and Western, 345 miles. As the average revenue per ton-mile was found to be about the same in all areas except Pocahontas, it follows that if the data were corrected for differences in average haul, the indexes would show the average rate levels in the South and West to be higher than those in the East.

In an effort to adjust the figures for differences in average haul, Dr. Ford K. Edwards of the Bureau of Transport Economics and Statistics has developed index numbers of "average revenue levels." These indexes show Southern rates to be 5.5. percent higher than Eastern, and Western rates 16.6 percent higher than Eastern. (See Table 3, and footnote for an explanation of Dr. Edwards' methods.) While these indexes are rough approximations, they suggest that the regional differences in average rate levels are much less marked than the regional differences in class rates. They also indicate that the higher commodity rates on many articles in the South and West than in the East are partly offset by lower commodity rates on other traffic.

Levels of Interterritorial Rates

Interterritorial rates are those governing shipments between points in different rate territories. As the class-rate levels vary from one territory to another, it is necessary to blend the levels in making interterritorial rates. Generally, the interterritorial rate level is intermediate between the levels of any two territories, but in some instances, especially where the hauls are long in the higher-rated territory, the interterritorial level equals or even exceeds the rates in the higher-rated territory.[10] In most cases the levels of interterritorial class rates lie closer to those of the higher-rated territory than those of Official Territory. Much controversy arises out of the difficulty of properly blending the various intraterrritorial rate levels.

[10] *Ibid.*, Figure 14 facing p. 166.

TABLE 3. INDEX NUMBERS OF "AVERAGE REVENUE LEVELS" OF RAIL FREIGHT RATES IN THE PRINCIPAL TERRITORIES, 1939[a]
(Eastern District = 100)

District or Region	Index
Eastern District	100.0
Southern Region	105.5
Western District	116.6

[a] The average length of hauls in the various districts and regions are estimated to be as follows: Eastern District, 252 miles; Southern Region, 282 miles; and Western District, 345 miles. (See I.C.C., Bureau of Transport Economics and Statistics, Docket No. 28300, Exhibit No. 195, p. 13.) The crude average revenue per ton-mile tends to understate the level of rates in Southern and Western territories with their longer average hauls as compared with Eastern, for the reason that rates do not increase in proportion to distance. In order to correct for the differences in average length of hauls as between the territories, Dr. Ford K. Edwards, of the Bureau of Transport Economics and Statistics, has compared actual freight revenues received in 1939 by the railroads in the Southern Region and Western District with the revenues they would have received if the Eastern level of rates had prevailed in the South and West. The procedure was to estimate the revenues per ton-mile for each of the commodity groups used by the I.C.C. for compiling traffic statistics, in each of the three areas, and also to estimate the average hauls. The Eastern revenue per ton-mile was then adjusted for each commodity group to what it would have been if the average hauls had been the same as prevailed in the Southern Region and Western District for that commodity group. (The adjustment of the Eastern revenues per ton-mile to Southern and Western average hauls was made by increasing or reducing the Eastern revenue per ton-mile according to the ratio that the revenue-per-ton-mile yield of the Eastern first-class rates for the Eastern average haul bears to the revenue-per-ton-mile yield under the same scale for the Southern or Western average haul.) This process was, therefore, designed to apply the Eastern rate level to the Southern and Western average hauls. From these hypothetical revenues per ton-mile the "constructive revenues" were computed, *i.e.*, the total revenues which the Southern and Western railroads would have received from each commodity group by using the Eastern rate level. The ratios of the actual revenues to the constructive revenues were then computed, and these became a measure of the "average revenue levels," with the Eastern level as 100.

Dr. Edwards has stated that the actual revenues, which are compared with the constructive revenues in his calculations, are overstated by a small amount because the revenue data used are gross revenues before deductions for pick-up and delivery allowances, switching absorptions, etc. Dr. Edwards believes that the overstatement is greater in the Southern Region than in the other territories, and concludes that the average rate level in the South is between 3 and 5 percent, instead of 5.5 percent, higher than the Eastern level.

Sources: I.C.C., Bureau of Transport Economics and Statistics, "Unit Costs for the Eastern Territory," etc., Exhibit No. 195, Docket No. 28300, pp. 10–16. Also Board of Investigation and Research, *Report on Interterritorial Freight Rates*, 1943, pp. 151–153.

There is no completely satisfactory way of measuring the levels of interterritorial class rates. However, rough approximations have been computed for distances ranging from 200 to 1500 miles, as shown in Table 4. The rates from Southern to Official Territory are 35 percent higher than within Official. Western Trunk-Line to Official rates are 37 percent higher, and Southwestern to Official rates are 49 percent higher.

TABLE 4. INDEX NUMBERS OF LEVELS OF FIRST-CLASS RATES WITHIN OFFICIAL TERRITORY AND TO OFFICIAL TERRITORY FROM CANADIAN, SOUTHERN, SOUTHWESTERN, AND WESTERN TRUNK-LINE TERRITORIES, BASED UPON HAULS RANGING FROM 200 TO 1500 MILES, 1939
(Official average rates = 100)

Territory	Index[a]
Within Official	100
Canadian to Official	110
Southern to Official	135
Western Trunk-Line to Official	137
Southwestern to Official	149

[a] Unweighted average rates.
Source: Tennessee Valley Authority, *Supplemental Phases of the Interterritorial Freight Rate Problem of the United States*, 1939, p. 7.

Interterritorial commodity rates, like intraterritorial commodity rates, are made on so many bases that it is virtually impossible to discern any consistent relationship between regional and interterritorial levels. For this reason, no attempt has been made to compute index numbers of interterritorial commodity rates.

Regional Levels of Average Rail Costs

Territorial differences in average rates are frequently justified on the ground that transportation costs are higher in the higher-rated than in the lower-rated territories. This contention seems to be invalid on the basis of official data on cost made public in recent years. According to a series of studies carried on by staff members of the Interstate Commerce Commission for the years 1928, 1933, 1936, and 1939, there is relatively little variation in average unit costs as between the several rate territories.[11] Two important exceptions are New England, where average unit costs are high, and Pocahontas where such costs are low. Costs are probably a little lower in Southern Territory than in the East, and perhaps six to nine percent higher, on the average, in the West than in the east. On boxcar traffic, which includes most of the class-rate traffic, the average unit costs line up in about the same way as on all carload traffic.[12] As a matter of fact, the differences in unit costs as between

[11] See Interstate Commerce Commission, "Territorial Variation in the Cost of Carload Freight Service on Class I Steam Railways in the United States for the Calendar Year 1936," Statement 3812, March 1938; "Territorial Unit Costs for Railroad Freight Service 1939," Exhibit 13, filed in Docket No. 28300, by Dr. Ford K. Edwards, September 1942; and "Rail Freight Service Costs in the Various Rate Territories of the United States," Senate Document No. 63, 78th Cong., 1st sess., June 8, 1943. See also Board of Investigation and Research, *Report on Interterritorial Freight Rates*, 1943, Chapter IX.

[12] See working papers used in computing the territorial cost comparisons appear-

individual railroads are far more pronounced than are the differences in average unit costs between areas.[13]

Regional differences in average unit costs are small as compared with the differences in average rates, especially class rates. Also, the costs do not always vary directly with the rates. It is evident that the differences in unit costs between individual railroads in a given region, which are largely disregarded in making territorial rates, are greater than the differences in average unit costs for groups in the several regions.

Many factors affect unit costs, including wages, materials costs, traffic density, composition of the traffic, terminal congestion, and character of the terrain. Until recently it was thought that the relatively high traffic density (measured by ton-miles per mile of road or track per year) in the East as compared with the South and West gave the former a cost advantage. It is true that the East does have a denser traffic than the South and West.[14] However, the advantage of high traffic density in the East is offset by other factors, among which high terminal costs due to congestion, lack of coordination, and high land values are probably most important.

Regional Distribution of Economic Activity

Economic activity in the United States is concentrated in the eastern part of the country, as shown by the reports of the United States Bureau of the Census. Official Territory, comprising about one-sixth of the land area of the country, contained slightly more than 50 percent of the total population in 1939.[15] In that year, the area had about 70 percent of the wage earners engaged in manufacturing, and produced about 69 percent of the dollar volume of the Nation's manufactures and 73 percent of the value added by manufacture. It received about 61 percent of the country's income, produced 58 percent of the combined value of raw materials and finished products, and shipped 60 percent of the total railroad tonnage. Official Territory obtained the bulk of its raw materials

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ing in the prepared statement of Dr. Ford K. Edwards, dated February 1943, circulated by the Interstate Commerce Commission. See also Board of Investigation and Research, *Report on Interterritorial Freight Rates*, 1943, p. 260.

[13] Board of Investigation and Research, *Op. Cit.*, pp. 277–278.

[14] Interstate Commerce Commission, *Statistics of Railways in the United States*, 1939.

[15] U. S. Department of Commerce, Bureau of the Census, and *Survey of Current Business*, August 1941.

from its own region; although reliable figures are not available, this territory probably obtained 85 percent of its minerals, 50 percent of its agricultural products, and 35 percent of its forest products from its own sources. It consumed perhaps 90 percent of its own manufactures, not counting exports to foreign countries. Clearly, the eastern area is the most productive and prosperous part of the country, if broad regions are compared.

It appears that the relatively unfavorable economic position of the South and West is not caused, as is claimed in some quarters, by the exploitation of their raw material resources by the East for the purpose of making large profits by producing manufactured products and sending a portion back to the outlying areas. This is true even though the South and West ship more than one-third of their raw material tonnage to the East for manufacturing and receive about one-third of their finished products from eastern points. These tonnages are small as compared with those produced and consumed within Official Territory.[16] The Board of Investigation and Research concluded after extensive study that "industry in the East is not overdeveloped, but that manufacturing in the South and West is underdeveloped. . . . The South and the West produce too little, both of raw materials and finished products. . . . The remedy is to increase manufacturing production in the South and West."[17] The Board said that growth in southern and western productivity will not harm the East, but, on the contrary, that it will increase the national income and prosperity of the country as a whole.

While Official Territory occupies a commanding position in regional economic activity, it lost ground relatively to certain other sections during the two decades between 1919 and 1939. According to the Census of Manufactures, the fastest growing manufacturing region during that period was the South. Significant increases were also registered by the Pacific and Southwestern areas. The greatest decline occurred in New England, followed by Western Trunk-Line Territory. While the Intermountain Territory in the West suffered a heavy loss in the number of manufacturing wage earners between 1919 and 1939, it held its own in the value of products and the value added by manufacturing.

[16] Board of Investigation and Research, *Preliminary Report on the Relative Economy and Fitness of the Carriers*, House Document No. 595, 78th Cong., 2d sess., 1944, pp. 8–9.

[17] *Ibid.*, p. 9.

Effect of Rate Differences Upon Regional Economic Development

Eastern Territory undoubtedly has many economic advantages over other sections of the country, including rate advantages. It has had the advantage of an early start, a large group of skilled, free workers, abundant resources, a populous market, and excellent transportation facilities. Eastern freight rates have been more uniform as to level and lower on the average than those in the South and West; southern and western railroads have been more interested in transporting raw materials produced in volume in their regions than eastern carriers, and southern and western rates have been more influenced by water and market competition than those in the East.

Regional differences in rail class-rate levels as well as construction of interterritorial class rates on a basis which is generally a blending of the intraterritorial levels, undoubtedly create difficulties for the manufacturers and dealers in the higher-rated areas. Regional differences in commodity rates may also create similar difficulties. Even if the extent of the market area available to producers is not absolutely restricted by the higher rates, they may be subject to economic disabilities because of the necessity of absorbing all or a portion of the rate differences in order to compete in the market area. Manufacturers in higher-rated territories may also be faced with higher production costs than their competitors in lower-rated areas to the extent that they depend upon raw materials drawn from the lower-rated territory on which they must pay higher interterritorial rates than their competitors. Manufacturers in higher-rated territories, therefore, may be faced with a two-fold disadvantage, first, because of high rates on raw materials drawn from other rate territories, and, second, because of high rates on the products shipped into lower-rated territories. Dealers face similar difficulties when competing for markets with other dealers located in the lower-rated areas.

These rate disadvantages, while restricting the market areas of the higher rated producers, should not be regarded as indefensible to the extent that the differences in rate levels are justified by differences in transportation costs and conditions. Producers may also be willing to establish plants in regions having higher freight rates in order to take advantage of other conditions which make for low costs of production, such as lower wages, low fuel or power costs, or nearness to raw materials. In such cases, the higher rates

may be borne by the producers in the higher-rated territory, but this fact does not necessarily justify the maintenance of average rate differences greater than the differences in transportation costs and conditions as between territories.

Without impugning motives, it is to be expected that individual railroads and groups of railroads in any given region will make freight rates favorable to the shippers they serve as a means of expanding or holding their traffic. Also, established economic interests in an area are in a position to make their desires known to the railroads, and usually can exert pressure to obtain favorable rate adjustments. The comparatively low level of rates on manufactured goods in Official Territory may be explained in part in terms of the desire of the northern railroads to preserve and protect the industries located in that area.

Why, then, have the southern and western railroads not likewise put into effect lower class rates in order to stimulate the growth of manufacturing in their respective areas? The question is pertinent because the railroads in those areas claim to be solicitous over the welfare of their shippers, actual or potential. Part of the answer to the question of high class rates on manufactures in the South and West is to be found in the lack of manufacturing there, which in turn has grown out of the interest of producers in low commodity rates on raw materials which they desire to sell in southern and eastern markets and in foreign countries. In order to establish these low rates, the southern and western carriers have felt obliged to maintain relatively high class rates on the rest of the traffic. Part of the answer derives from the long-standing quarrel between the southern and eastern roads over the division of lower joint rates between rate territories. And part of the difficulty arises from the reluctance of the eastern carriers to join southern and western carriers in publishing lower joint through rates from southern and western producing points to eastern markets than are presently in effect.

The obvious result of this rate situation is a tendency to perpetuate whatever particular regional specialization may exist in an area. Newer economic interests, such as manufacturers in the South and West, must frequently make their way against established rate adjustments which are a handicap to them.

Placing class-rate relationships on a more uniform basis throughout the United States would have an effect upon the location of

some industries or the volume of output in various areas, but determination of the extent to which particular industries in specified communities would be affected would necessitate a careful study of the importance of the rate relationships upon the operation of the industries in question. On the whole, it seems safe to say that territorial differences in class rates have had a limited but real effect upon the locational pattern of the industries of the country. Equalization of class rates, distance considered, while not likely to cause a revolutionary shift in manufacturing, other conditions remaining unchanged, would doubtless stimulate greater industrialization of the South and West. Such equalization might, however, have important adverse effects upon some individual railroads dependent upon class-rate traffic for a significant portion of their revenues and upon some industrial or commercial enterprises located in the East.

It is not proper to conclude, as some have done, that nothing should be done about territorial class rate differences merely because they have not had prime influence in determining regional specialization of manufacturing, or because some established economic interests would suffer from a change in the rates. If such rate differences have had indefensible adverse effects, and it is obvious that the South and West have suffered a degree of unwarranted disadvantage in the class-rate structure, the shippers in those areas are entitled to receive the aid of Government in obtaining remedial action.

Alternative Methods of Securing Greater Uniformity in Class Rates

If it is agreed that existing regional differences in class rates are in need of adjustment, the remaining task is to analyze the alternative methods that might be adopted to secure a greater degree of uniformity in such rates.

First, interterritorial freight rates might be made more uniform through individual rate proceedings before the Commission. Although this method of rate adjustment has been used for a long time, it has serious limitations for the purpose of securing greater equality in class rates. The necessary data relating to rates, costs, and commercial conditions are generally not available, under a piecemeal process, to small or inexperienced shippers most in need of rate adjustments. Such proceedings may also be unduly burdensome to shippers, whether large or small, whose interests are di-

rectly at stake. Above all, the broader aspects of the public interest may be inadequately represented in such cases.

A second possible method would be to establish a definite rule that all interterritorial freight rates shall not exceed, distance considered, the level of rates in effect in the destination territory. Termed the "destination-level" basis of rate-making, this method would undoubtedly compel a considerable increase in the use of distance scales in rate-making. The current practice of grouping or blanketing rates would probably have to be given up on most interterritorial shipments. This rule would also result in the establishment of different rates over the same line or route for equal hauls in reverse directions. At the present time, the class rates between identical points in any two territories are generally the same in opposite directions on traffic uniformly classified. This arrangement would have to be abandoned if the rates were set on a destination-level basis. The rates from the higher-rated to the lower-rated territory would be lower for hauls between any given pair of origins and destinations than the rates from the lower-rated to the higher-rated territory. In cases where the portion of the haul was relatively short in the lower-rated territory, many instances of long-and-short haul discrimination would unquestionably be created on shipments from the higher-rated to the lower-rated territory; the rates on the entire haul would be on the basis of the rates in effect in the lower-rated territory, while a shorter haul in the higher-rated territory would be on the high-rate basis. The destination-level basis would create difficulties for sellers in the lower-rated territory endeavoring to reach markets in the higher-rated territory by raising the rates on such traffic. Also, the consumers in the higher-rated territory would have to pay higher prices for products which they secured from the lower-rated territory. Therefore, the destination-level basis of making interterritorial rates has little to recommend it. It is wrong in principle, and, if adopted, would only make the situation worse than it is at present.[18]

A third method would be to continue to recognize separate rate territories, either with existing or different boundaries, but with

[18] The destination-level basis might conceivably be adopted by the voluntary action of the railroads, or by a decision of the Interstate Commerce Commission, with or without specific statutory direction. Steps in this direction have, in fact, already been taken by the Commission in regard to certain manufactured products which are shipped from the South to the East in competition with eastern products. But the practice is not yet widespread. A number of bills embodying the sense of this method have been introduced into Congress, but none has passed so far.

with rate scales that vary only in accordance with territorial differences in composition of traffic, costs, and carrier revenue needs. Classifications would be made uniform in all regions, and rate scales would be more nearly harmonized than at present. Territorial rate differences would be lessened but probably not be entirely eliminated. The method would not, however, get around the difficult problem of constructing interterritorial rates or settle the controversy about equal rates, distance considered, on competitive traffic shipped from higher-to lower-rated territories.

A fourth method would be to establish a uniform classification and uniform class-rate scales throughout the entire country. This method would abolish regional rate structures. Evidence developed by Government agencies indicates that average unit costs of the rail carriage of most commodities do not vary greatly from one area to another. Important exceptions are New England Territory where average costs are relatively high and the Pocahontas Region where average costs are relatively low. But with these and any other important exceptions appropriately taken into account in fixing rates, the class-rate levels and progressions could readily be placed upon a more nearly equal basis than at present, so far as average unit costs are concerned. Use of basic national class-rate scales would avoid the necessity, which now causes so much controversy, of constructing interterritorial class rates as some sort of a blend of the applicable intraterritorial rates.

Conclusion

In this paper, the interterritorial rate problem is viewed from a national rather than a sectional viewpoint. A proper settlement of the issues involved should not depend, therefore, upon sole consideration of the gains or losses that any particular region, industry, or railroad might suffer or enjoy as a result of eliminating or reducing existing rate differences. Nor should the rate structure be manipulated to stimulate the location of industries in any particular area or community, or to preserve their location in other regions, or to foster either centralization or decentralization of enterprise, unless the Government is prepared to set forth clearly its social objectives and the procedures for realizing them insofar as they run counter to established and generally accepted rate-making principles and policies.

Ideally, those responsible for making rates, railroads and Gov-

ernment together, should remove barriers in the way of locating each industry at the point where the sum of production, transportation, and distribution costs are the lowest, or where, for service reasons, it is advantageous to locate an enterprise. Where it is possible to do so, changes should be made gradually so as to minimize the disruption of long-established arrangements. Generally speaking, a rate structure that confines the application of value of service factors to the differential treatment of commodities and possibly the preferential treatment of very long hauls will best serve the public. Territorial differences should be permitted to exist after a reasonable period of time for adjustment only on a positive showing by the carriers that significant differences in transportation conditions and costs exist as between the several regions.

Removal of existing differences in territorial class rates, except those justified by differences in transportation costs and conditions, would no doubt permit some manufactured products in the South and West to move more freely into eastern markets. Equalization of class rates to this extent, if it were carried out on the basis of Official Territory scales or on an otherwise low-level basis, would generally benefit the country as a whole. In time, each place or area would be more nearly able to develop types of enterprise, as far as freight rates are concerned, for which its human and natural resources were best fitted. In this way, a sounder geographical division of labor than has yet existed in the United States would be promoted.

Because of the relatively small volume of traffic moving under standard class rates, it follows that a reduction or elimination of class-rate differences would necessitate only a small increase in average commodity rates in the South and West to offset any revenue losses that might be incurred by the railroads on class-rate traffic. It is important to keep this point in mind in reaching a judgment on the issue of class-rate adjustments in relation to the freight rate problem as a whole, It is possible that, after an initial period of time following the adjustment of rates, the volume of traffic would expand sufficiently to restore the former earnings to the carriers. In such event, increases in commodity rates could be eliminated and the public would reap the full benefit of the lower rates.

The period of higher commodity rates could be shortened by adoption of a program of rail integration designed to create a relatively small number of strong systems. In this way, the needs of

numerous weak railroads scattered through the South and West could readily be cared for. Further rationalization of rail plant and equipment would also be helpful in establishing a lower and more uniform level of class rates in the South and West without placing a burden on the other traffic.

A word should be said in closing about the burden of proof in rate cases before the Interstate Commerce Commission. The vital question in this respect is whether the burden should be placed on those who assert or on those who deny that rates should be generally uniform, distance considered. The Commission is required by the statutes, as interpreted by the courts, to consider the facts about transportation conditions and costs in prescribing or approving rates. These facts are peculiarly within the knowledge of the carriers, and the burden should not be on others to prove them. As Dr. Nelson L. Smith, former Chairman of the Board of Investigation and Research, said in his dissent from the recommendation of the majority, ". . . Responsibility, both for the inadequacies of data and for the improvement of the existing rate situation, rests on the carriers and the regulatory agency."[19] The fact that shippers are now required to prove facts which are generally beyond their knowledge is one of the chief difficulties with the rate situation today. Therefore, whatever method or combination of methods may be employed to lessen existing differences in territorial class rates, the burden of proof should be placed upon those who wish to depart from uniformity rather than upon those who want uniformity. This would shift the burden of proof from those who, at present, are required to prove their case for uniformity, to those who would properly bear it.

[19] Board of Investigation and Research, *Report on Interterritorial Freight Rates*, 1948, p. 354.

RESEARCH IN MILK MARKETING: A REVIEW

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FOR a number of years research workers in milk marketing have been engaged in studying measures for "rationalizing" the city distribution and the country handling of milk, and in computing the possible savings incident to the adoption of these measures. The preoccupation of research workers with this subject has been related to the search for ways of bringing about a lower cost of handling milk from the farm to the consumer. Depending upon the interest of the research worker or institution with which he has been affiliated, the objective of a lower margin has been to get a higher price to farmers for milk or a lower price to consumers. Public interest in the price of milk has always been high, but particularly so since 1929 when reduced purchasing power by masses of consumers curtailed for a time their buying of milk. An incidental effect has been that the price of milk has assumed considerable political significance, and this has in turn further contributed to discussion, study, and investigation of the "milk problem" by a number of people.

In line with this trend of research, the Storrs Agricultural Experiment Station of the University of Connecticut has issued a series of nine bulletins under the general title of "Efficiency of Milk Marketing in Connecticut,"[1] in which the main emphasis has been placed upon the consideration of measures for reorganizing the handling and distribution of milk, as a means of eliminating inefficiency and duplication, and upon the computation of potential

* The views expressed in this paper are the author's alone.

[1] Storrs Agricultural Experiment Station, University of Connecticut, *Efficiency of Milk Marketing in Connecticut: 1. Supply and Price Interrelationships for Fluid Milk Markets*, Bulletin 237, by D. O. Hammerberg, L. W. Parker, and R. G. Bressler, Jr., February 1942; *2. The Transportation of Milk*, Bulletin 238, by D. O. Hammerberg and W. G. Sullivan, February 1942; *3. Economics of the Assembly of Milk*, Bulletin 239, by R. G. Bressler, Jr., and D. O. Hammerberg, February 1942; *4. Retail Distribution of Milk by Producers*, Bulletin 243, by D. O. Hammerberg, I. F. Fellows, and R. H. Farr, December 1942; *5. Economics and Biology of Alternate-Day Milk Delivery*, Bulletin 247, by R. G. Bressler, Jr., E. O. Anderson, D. A. Clarke, Jr., and E. N. Bilenker, May 1943; *6. Truck Costs and Labor Requirements on Milk Delivery Routes*, Bulletin 248, by D. A. Clarke, Jr., and R. G. Bressler, Jr., June 1943; *7. Milk Delivery in Rural Connecticut*, Bulletin 249, by Alan MacLeod and C. J. Miller, July 1943; *8. Possible Milk Delivery Economies in Secondary Markets*, Bulletin 252, by S. K. Seaver and R. G. Bressler, Jr., May 1944; *9. Conservation Possibilities in Retail Delivery in Major Markets*, Bulletin 253, by R. G. Bressler, Jr., D. A. Clarke, Jr., and S. K. Seaver, October 1944.

savings incident thereto.[2] These bulletins represent a research task of considerable scope and embody much effort in planning and execution of an elaborate project over a relatively long period of time. Not all of the bulletins, however, address themselves to the question of efficiency in milk marketing, and much of the space in those that do deal with that question, is taken up with a detailed description of the production and distribution of milk in Connecticut.[3] On this point they contain much valuable material and will undoubtedly be an important source of information for this purpose.

The Connecticut bulletins, as well as the similar studies by other research workers,[4] amply demonstrate the presence of elements of inefficiency and duplication in the organization of milk marketing in its various stages from the farm to the consumer. That these exist has, of course, been evident to any observer. The bulletins, however, go further and furnish a degree of measurement of the savings or economies that could be achieved by the elimination of these inefficiencies and duplications in the milk business through the adoption of measures involving the following:[5] (1) Allocation of producing areas, i.e., assignment of producers to milk markets so as to minimize the costs of moving milk from farms to markets, to be brought about through some control mechanism other than price; (2) reorganization of the milk trucking system, involving the consolidation of routes by a public agency or the carrying out of all trucking operations by a single private agency which would be established as a legal monopoly; (3) the adoption of every-other-day delivery; (4) the allocation or assignment of exclusive territories or zones to milk distributors; and (5) the distribution of milk from a single central plant.

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[2] "To determine the magnitude of the savings that would result from more efficient milk marketing in Connecticut, studies are being made of the various operations involved in the movement of milk from producer to consumer. These studies attempt to devise methods of performing each operation as efficiently as possible. The costs involved in the reorganized operation are then computed and compared with the costs incurred under the existing system."—Bulletin 237, p. 4.

[3] Bulletin 243, on operations of producer-distributors in Connecticut, and Bulletin 248, dealing with truck costs and labor requirements on delivery routes, do not consider or propose any "rationalization" measures. Both of these studies are definite contributions to their respective fields.

[4] Bulletin 252 of the series under review contains a selected bibliography on milk distribution efficiency, listing 34 studies and papers on this subject.

[5] The bulletins also propose the establishment of country separating plants. Since this is a common method of handling milk in milksheds, there is nothing novel about the proposal, and it will not be considered further in this paper. It is assumed, however, that country separating plants will not be established unless milk distributors or cooperatives find it profitable to do so.

If the principal objective of the studies, aside from the descriptive matter they contain, was to compute, as a matter of academic interest, the technical savings or economies possible through the adoption of the proposed "rationalization" measures, then this objective has been reached. If, on the other hand, the studies have aimed at making a constructive and meaningful contribution toward an effective means of bringing about a lower price for milk to consumers, or a higher price to farmers, or toward the establishment of a sound social policy with respect to the milk industry, they fall short of the mark. The remainder of this article will be taken up with some comments as to the reasons, in the writer's viewpoint, for this. The discussion, which will fall into three parts, will conclude with some suggestions as to a possible approach for reducing the cost of distributing milk.

I. The technical economies possible from the adoption of some of the measures listed above are an aspect of the principle of the economies of large-scale production and of combination, and are, therefore, subject to the limitations of that principle. The increased efficiency obtainable from the "rationalization" measures belongs to that category of economies which are derived from an increase in the scale of production or size of business. This is obviously true in the case of the delivery of milk from a single central plant, but it is also applicable to some of the other measures.

But there are limitations to the principle in question, as there are limitations to the operation of other social laws, and these have to do with the diseconomies, such as increased organizational costs, which are introduced as the scale of output, or the size of business, increases. As Professor Knight has pointed out, in order to make the savings of large-scale production possible, "large organizations must exist and the cost of internal cohesion in large groups of men is very high."[6]

Applying this thought to the measures under consideration, it is evident that public agencies would need to be established to make the adoption of some of the measures possible or to carry them out. For instance, to achieve the most efficient allocation of milksheds would necessitate the determination of the optimum areas and the assignment of producers to the markets to which they are to ship milk.[7] This would need to be done every time there is a significant

[6] Knight, Frank H., *The Ethics of Competition and Other Essays*, p. 215.

[7] Difficulties with producers would be almost inevitable, especially with those for whom a change in markets would mean a lower price for their milk.

disturbance in conditions, such as new producers starting in production, changes in population in one market in relation to other markets in the State, etc.[8] To operate a trucking arrangement of maximum efficiency, truckers and producers would need to be paired with each other. Again, significant changes in the number of producers, or in the volume of production, would mean rearrangement of trucking routes and new assignments.[9] The costs of doing all this—the expenses of the directing and coordinating agency—are the diseconomies involved in the measures proposed. Of course, it should not be concluded that these diseconomies will necessarily offset the technical savings obtainable through a "rationalized" system of distribution. The point must be made, however, that these diseconomies cannot be ignored.

The significance of what has been said is demonstrated in some degree by actual conditions in the milk industry. While it is true that the larger firms in the milk business are generally the most efficient ones, yet there are many small firms that are probably just as efficient on an over-all basis and particularly so from the point of view of their ability to undersell the larger firms. In fact, the practice of small firms of underselling the larger ones was recognized by the State of New York when it fixed retail prices for milk from 1933 to 1937. It established a lower minimum price for relatively unknown brands of milk, these being the brands of small firms, and fixed a higher price for the well-advertised brands of the larger firms. In doing this it merely continued a condition which had existed in the milk trade in New York before retail price regulation was undertaken.[10] It is a common observation that the lowest price for milk in a market is frequently that charged, not by a large firm, but by a small or medium-sized firm.

II. It is one of the functions of an economic system to determine the kinds of goods and services to be produced and the relative

[8] The bulletins only consider milksheds and markets in the State of Connecticut. There is, of course, no reason why the process of allocating producing areas and assigning producers should stop at State lines, particularly when, as in Connecticut, milk is shipped to other States.

[9] This is not to say that trucking rates should not be regulated, or reduced where they are too high. This is a recognized function of established regulatory authorities and has no relation to a "rationalized" trucking arrangement. Nor can there be any objection to a farmers' cooperative controlling the assembly and transportation of milk for all its producer-members or for all producers who may wish to patronize it. Finally, it goes without saying that there can be no objection to the conservation of trucking facilities in wartime.

[10] *Borden's Farm Products Company* v. *Baldwin*, 293 U. S. 194; *Borden's Farm Products Company* v. *TenEyck*, 297 U. S. 251.

amounts of each. But, in a free enterprise economy, this determination is made, not consciously by some individual, or by a group of individuals, or by a public agency, but rather automatically by the established social organization of the exchange system. Each individual is free to spend what purchasing power he has, in the way that he wishes, or to withhold it and invest it. It is presumed that, if he spends it on consumption goods and services, he will be able to decide the relative importance of his wants and will make corresponding expenditures. Producers, on the other hand, will supply the goods and services in greatest demand, and will utilize productive resources to produce such goods and services. To obtain these productive resources, including labor power and equipment, they will use the proceeds from the sale of the goods and services produced. The productive resources allocated to each use will correspond with the relative urgency of the demands, expressed in value terms.

Measures for limiting the home delivery of milk to alternate days,[11] or, as some have proposed, for abolishing home delivery entirely, would involve a substitution of conscious planning for the "planless" methods of the free enterprise economy. It would deny the satisfaction of certain wants by abolishing services which the public, or a section of it, is demanding and is willing to pay for. The "efficiency" obtained thereby would presumably be that of not expending resources in the production of these services.

"Efficiency" is a word of several shades of meaning and connotations. In economics, the term connotes the production of a large social income, expressed in market values of goods and services produced, and the realization of a maximum of want-satisfaction.

[11] The authors of Bulletin 247, which deals with every-other-day delivery, do not openly recommend the use of this system in peacetime, though the fact that the study was undertaken, and that it was published as a contribution to research in milk marketing at a time when every-other-day delivery was already established in Connecticut, would at least imply that the authors were thinking of postwar conditions. This implication is strengthened by the fact that the following statement is included in the conclusions (at page 34): "If alternate-day deliveries are continued in the postwar period, and if weekly earnings of routemen return to normal prewar levels, total delivery costs would be approximately 2.74 cents, a saving of 1.32 cents per quart." (The savings during the period covered by the study were only about 0.4 cent.) It is also strengthened by the statement in Bulletin 252 (at page 3) that, "the studies were conceived to have as much bearing on developments in the postwar period as in the war-time situation." In any case, the continuation of every-other-day delivery after the war is being seriously proposed in some quarters, as witness the statement (at page 33, Bulletin 247) that a number of health officials "thought that this method would become a permanent part of the milk delivery system."

The achievement of these requires, not only the full utilization of available productive resources, but also an optimum distribution of such resources, that is, an economical allocation of them among the various uses to which they may be put. This, in turn, necessitates an unimpeded movement of resources from less productive to more productive uses.

It is assumed that the resources being used in the delivery of milk to homes represents the most efficient use of them that can be obtained, and that the withdrawal of these resources from this service and their diversion for other purposes would result in a less efficient use. It would be particularly so, of course, if the resources withdrawn remained idle altogether. The opposition by labor unions in some areas to every-other-day delivery, even as a wartime measure, was precisely on the ground that their driver-members would be forced into less remunerative employments, or would become unemployed.

In the light of these factors, it is difficult to see what there is to be gained from measures which would deprive consumers of services for which they are willing to pay. Aside from the immediate war period, there is no shortage of productive resources which would require the kind of abstention and self-denial that is involved in curtailing home deliveries of milk. On the contrary, the main problem in the postwar period is expected to be that of providing full employment. This will be a difficult task under the best of circumstances, and it will not be aided by proposals which reduce employment. Moreover, it is to be pointed out that, if the social cost of unemployment is taken into account, the savings obtained by reducing services are considerably diminished. Thus, it may be found in the end that the public would in one way or another be bearing the cost of home-delivery services without actually obtaining them.

A corollary of what has been said is that, while consumers should be permitted to obtain such home-delivery services as they are willing to pay for, the converse should also be true, namely, that consumers obtaining such services should be required to pay for them. That is to say, they should be required to pay a higher price than that charged for milk sold from stores. When this is not true, that is, when store buyers of milk pay the same price as that charged for home-delivered milk, they subsidize home delivery. Since the income of consumers who have milk delivered to their

homes is generally higher than the income of those who buy milk in stores, failure to have a store differential (i.e., a lower price for milk at stores) has meant that lower-income groups have been subsidizing higher-income groups.

III. The establishment of monopoly or limited monopoly is involved in two, and possibly three, of the measures under consideration. The zoning of urban areas and the assignment of exclusive zones or territories to individual distributors, and the establishment of a central plant for the carrying out of all distributive functions, would obviously mean a substantial degree of monopoly control. The proposal for "rationalizing" the milk-trucking system would involve monopoly control only if this were the means selected for the attainment of the efficiency sought. Thus, under the guise of efficiency, monopoly would be established, at least with respect to two of the measures under consideration. This would not be a novel occurrence. It has been observed by some writer that the modern cartel movement marched under the banner of "rationalization." In contrast, however, with the development of monpoly in other fields, which had to overcome the anti-trust laws and public sentiment, the extension of monopoly in the milk business would presumably be compelled by the state.

The competitive system means more than freedom to engage in economic enterprise. It has historically been a progressive force in the development of our present-day economy, and has been responsible in good part for the advancement achieved in the economic welfare of western civilization.[12] As Professor Clark has pointed out, "under a competitive system industry has been revolutionized at an incredible pace and tremendous increases in physical productiveness have been forthcoming."[13] Monopoly, on the other hand, has meant higher prices, and, what is worse still, a reduced output.[14] " . . . the key to the meaning of monopoly lies in the power to control supply, and hence to maintain prices

[12] It is a curious thing that our present-day textbooks on economics, and the methods of teaching it, fail to impress upon students the progressive character of the competitive system as against the retarding influence of monopoly. It is interesting to compare this with the treatment of monopoly by Adam Smith in *The Wealth of Nations*.

[13] Clark, John M., *Social Control of Business*, p. 140.

[14] Recent elaborations of monopoly theory have, by applying the principle of marginalism, demonstrated the economic basis for the exercise of monopoly power to realize higher prices. It may be noted, however, that, not having demand schedules for the things they sell, monopolists have not been able to utilize fully the formulas for maximizing profits which were so carefully worked out by their authors.

and profits above the competitive level. This is naturally regarded as a reward for giving the consumer less for his money rather than more, and reducing the usefulness of the industry to the community, rather than increasing it."[15]

It is true that elements of monopoly have increased in importance in the last 50 years, due to a variety of causes, not the least important being "the natural urge to cease competing and combine."[16] Our public policy with respect to monopoly, as expressed in the anti-trust laws, remains unchanged, however. In fact, the Federal Government has, during the last few years, increased its activities in connection with the enforcement of these laws.[17] It is to be assumed that it is the collective viewpoint of those in charge of administering the anti-trust laws that the suppression of monopoly and the encouragement of competitive enterprise is still a sound social policy for the United States to follow, at least for certain industries.

Presumably, the extension of monopoly control in the field of milk marketing would be justified on the grounds that it would be publicly regulated, and that, through such regulation, the benefits of the resulting efficiencies would be passed on to the public.[18] There can, of course, fundamentally be no objection to this, assuming that the unit cost of handling milk from the farm to the consumer, that is, the distributive margin, would actually be reduced and that the economies of plant operation and nonduplicated deliveries would not be absorbed by a greater overhead cost arising from increases in salaries, bonuses, and similar payments. However, from what has been said above concerning the limitation of the law of the economies of large-scale production, it certainly cannot be taken for granted that the net effect of monopoly operation would be a lower distributive margin, especially when the cost of the proposed social control is taken into account. It is to be remembered that we are not dealing here with a natural monopoly, such as an electric or gas company, where competition is obviously impractical.

[15] *Ibid.*, p. 385.

[16] Clark, John M., *Studies in the Economics of Overhead Costs*, p. 147.

[17] One of the most important of the recent anti-trust cases is that of *United States* v. *South-Eastern Underwriters Association*, decided by the Supreme Court on June 5, 1944.

[18] "If efficiency can only be gained through a considerable degree of monopoly, the problem then is to control this monopoly in a way that will return the economies to producers and consumers."—Bulletin 238, p. 27.

Assuming that monopoly operation would bring about a net reduction in the distributive margin, the question still remains whether public control of monopoly would be sufficiently effective to secure the savings to consumers by a reduction in the retail price for milk, or to farmers by an increase in the return to them. The feasibility of public control in the milk business must be considered in the light of the existing social and legal framework. Account must be taken of the likelihood that local or State agencies, as distinguished from Federal agencies, would be the instruments of control. Milk control boards or commissions are now in existence in 16 states. Thirteen of these establish minimum prices at which milk may be sold by distributors, peddlers, or stores. It is in the operations of these boards that we must look for a clue as to the probable effectiveness of social control of the milk business. While space does not permit an evaluation of their work, the general observation may, nevertheless, be made that the means and facilities of local or State agencies for carrying out an effective program of monopoly control would be limited, in respect of both financial support and personnel. As Professor Clark has pointed out, the resources of the modern political state "are limited in comparison to the 'interests' it strives to control, and its experts are typically pitted against higher-paid experts, presumably of greater ability."[19]

What has been said above should not be interpreted to mean that there is no room for improvement in the milk marketing organization, or that improvements are not called for. On the contrary, possibilities of lower costs of handling milk do exist and they should be exploited to the full, but they lie, not in the "rationalization" of the industry, but in the creation of conditions which are favorable to, and which would encourage, price competition among milk distributors. Such competition, by compelling a lower price for milk,

[19] Clark, John M., *Social Control of Business*, p. 165.

Public ownership and operation of the milk distributive system involves a number of considerations different than the ones developed above. Government intervention of this type has been proposed by some as a solution to the problems facing a number of industries. One such proposal is the recommendation by Henry C. Simons, which suggests "direct government ownership and operation in the case of all industries where competition cannot be made to function effectively as an agency of control." (*A Positive Program for Laissez Faire: Some Proposals for a Liberal Economic Policy*, University of Chicago Public Policy Pamphlet No. 15, p. 18.) In milk, government ownership and operation has frequently been thought of as a function of municipal government. Cf. *A Survey of Milk Marketing in Milwaukee*, Agricultural Adjustment Administration, 1937; and A. J. Nixon and O. M. Reed, *Municipal Milk Distribution in Tarboro, North Carolina*, Agricultural Adjustment Administration, 1938.

would force the adoption of efficient methods of handling milk by individual firms. If prices are reduced by competition, it may be expected that costs will adjust themselves to the lower price level. The cost of distributing milk has exhibited considerable flexibility in adjusting itself to the actual return received by distributors. Analysis of milk distributive margins has shown that, when the return to distributors goes down, operating costs are brought in line through the elimination of inefficient handling methods and through adjustments in overhead costs. Inefficient milk routes and wasteful practices in acquiring and holding customers are eliminated, and high-cost distributors are forced out of business altogether, bringing an increased volume and lower unit costs to the distributors remaining in business. When the return to distributors goes up, on the other hand, inefficiencies creep in and overhead costs increase. The extent to which distributive margins are susceptible of being reduced through the operation of competitive forces may be judged from the fact that in the District of Columbia, with a cost of milk to distributors of 8.8 cents per quart, milk may be bought in retail stores at $11\frac{1}{2}$ cents per quart, while in Pittsburgh, for example, with a cost to distributors of 7.9 cents per quart, the minimum store price is $15\frac{1}{2}$ cents per quart.

One approach in the creation of conditions favorable to competition should be the avoidance of methods in the marketing of milk by farmers which will handicap small firms in competing with the larger ones. An illustration of other types of policies to be avoided is the practice, which is sometimes encountered, of fixing the same price for store milk as for milk delivered to homes, or the establishment of a higher price for milk sold in paper containers than for milk sold in glass bottles. It is in the search and development of these and similar lines of approach that economists and research workers may find the most fruitful fields for meaningful results, and not in the conduct of investigations that might as well be left to engineers, cost accountants, or efficiency experts.

Finally, it is not to be concluded from what has been said that we should become complacent about economic waste. But, since a condition of waste is not one peculiar to the milk industry, the solution, if there is one, must be along more general lines. Wastes and inefficiencies exist in many other fields of enterprise and particularly in retailing. And, what is more serious still, economic wastes of this character are dwarfed by the stupendous losses incident to business depressions.

NOTES

CONSOLIDATED BALANCE SHEET AND INCOME STATEMENT FOR AGRICULTURE*

A COMPARATIVE consolidated balance sheet and a comparative consolidated income statement for farms of the United States were employed as tools for economic analysis in the "Impact of the War on the Financial Structure of Agriculture,"[1] which recently was published by the Bureau of Agricultural Economics. It is hoped that these financial statements will appear each year hereafter. A number of matters of definition and procedure need to be clarified. The uses and limitations of these reports should be carefully considered. This note is intended to review a few of the pertinent issues.

Concepts

The going concern is the entity for which the consolidated balance sheet and the consolidated income statement appearing in the "Impact of the War . . . " were prepared. These financial statements represent neither summations of the financial condition of individual farm operators, nor of persons engaged in farming and living off farms, nor of persons engaged in farming and living on farms. Income series for these three special groups, covering income from farming and from other sources, are in fact prepared by the Bureau of Agricultural Economics. But the consolidated balance sheet and income statement appearing in the "Impact of the War . . . " do not reveal the financial condition of any combination of persons but only of a combination of farming concerns.[2]

The farming concerns should therefore be defined. The "Impact of the War . . . " study does not offer an explicit definition of a farming concern. Nevertheless definitions are implicit both in the balance sheet and in the income statement. The two definitions

* The author of this note is indebted to many of his colleagues on the BAE staff for helpful criticism. The author alone is responsible for the views and suggestions expressed.

[1] By A. S. Tostlebe, D. C. Horton, R. J. Burroughs, H. C. Larsen, L. A. Jones, and A. R. Johnson, under the direction of Norman J. Wall, September 1944 in mimeographed form. Printed edition about May 1945.

[2] A concept entirely different from any of these is that used in the national income estimates of the Department of Commerce, *National Income in the United States, 1929–35*. In the concept of the Commerce Department, income of agriculture is limited to that of operators from their own operations and not including rent of any land they may lease to other farmers. All rents paid are classed with financial income.

are not altogether consistent with each other. The balance sheet includes the household furniture and equipment among the assets. The income statement does not include an implicit investment return, i.e., rental income and depreciation expenses, on account of the furniture. The balance sheet includes the value of the family automobile. The income statement assigns only 40 to 50 percent of the cost of operating the family car to farm expenses. The balance sheet includes various intangible assets such as United States savings bonds and bank deposits on which interest accrues or is paid in cash. The income statement does not include income from these sources.

The implicit definition contained in the balance sheet seems to say that farming activities include production of agricultural products for sale and for home consumption, participation in cooperative marketing and credit organizations, investment in shelter and furniture for the farm family, provision of transportation in the farm truck and the family automobile, and management of the intangible financial resources of the farm operator, including funds and investments not required in farming.

The implicit definition contained in the income statement seems to say that farming activities include production of agricultural products for sale and for home consumption, investment in shelter but not furniture, and provision of transportation in the farm truck or family automobile for farming purposes only. Only 40 percent (and recently 50 percent) of the depreciation expense on the family automobile is charged to farming. The remaining depreciation is assumed to be assignable to personal rather than to farming expense. Income or expense incident to the operator's furniture or personal intangible assets are omitted from the income statement.

If the consolidated income statement were revised to include an estimate of income produced by all items included in the existing consolidated balance sheet, the reported return to farms would be increased somewhat though not to an important extent. The disadvantage of such a revision would be in the broadening of the term "farming" to include activities that are virtually unrelated to agricultural processes.

If, on the other hand, the consolidated balance sheet were revised in such a way as to be consistent with the existing consolidated income statement, then furniture, 50 or 60 percent of the valuation of passenger automobiles, and intangible earning assets of farm

operators would be dropped from the balance sheet. To eliminate intangible earning assets, time deposits would be deducted from the "currency and deposits" item and United States savings bonds and investments in "co-ops" would be dropped. However, currency, demand deposits, and warehouse receipts which produce no direct income could be retained. Such assets, at least in part, are essential to farming operations. Only 40 or 50 percent of the valuation of farmer-owned family automobiles would be retained with farming assets.

A definition of farming which would permit a reconciliation of the balance sheet with the income statement in the manner just indicated and which would list only items that can be measured, follows: Farming includes the production of agricultural products for sale and for home consumption, the investment in shelter for the farm family, the transportation of persons or commodities for farming operations only, and the management of cash, demand deposits, and warehouse receipts belonging to farm operators. Stated somewhat more concisely it runs thus: Farming includes production of plants or animals and their products for sale or home use and other activities directly incident thereto. A balance sheet conforming to this definition is shown in table 1.

The investment in furniture and in that share of the family automobile attributed to nonfarming use, can and as suggested should be eliminated from the balance sheet. Such assets are personal property of the operators but are not a part of the farm plant. By the same token it would seem that the investment in housing (or at least most of it) should be eliminated.

As a practical matter the investment in housing cannot easily be excluded from the balance sheet. Farm real estate valuations are not conveniently separated into those pertaining to housing and to other real estate. Moreover, if this asset were eliminated, a portion of the mortgage debt also would have to be eliminated, as mortgage debts are secured by real estate as a whole. The debt secured by farm housing is not a separate element.

The elimination of housing from the balance sheet also would make difficult a reconciliation with the income statement. The data for taxes, insurance, and interest which appear in the income statement include a portion attributable to farm housing which cannot be separately identified. Only expense for maintenance and depreciation of the farm house could be identified. Since housing expense

remains in the income statement, the implicit gross rental income from that housing also must remain. In effect, then, the net income from farming includes the implicit interest income on the investment in the dwelling unit.[3]

TABLE 1. PROPOSED CONSOLIDATED COMPARATIVE BALANCE SHEET OF FARMS OF THE UNITED STATES, 1940–44[1]

Item	Jan. 1, 1940	Jan. 1, 1941	Jan. 1, 1942	Jan. 1, 1943	Jan. 1, 1944	Net change 1940–44	
	Million dollars	*Million dollars*	*Million dollars*	*Million dollars*	*Million dollars*	*Percentage*	*Million dollars*
Asset items:							
Tangibles:							
Real estate[2]	33,642	34,026	36,611	39,963	45,592	+ 36	+11,950
Non-real estate:							
Machinery and equipment[3]	2,569	2,696	3,212	3,444	3,477	+ 35	+ 908
Livestock	5,132	5,320	7,042	9,541	9,526	+ 86	+ 4,394
Crops[4]	2,339	2,493	3,409	4,576	5,595	+139	+ 3,256
Intangibles:							
Currency and demand deposits	2,604	2,953	3,826	5,593	7,687	+195	+ 5,083
Warehouse receipts	323	470	394	490	513	+ 59	+ 190
Total assets	46,609	47,958	54,494	63,607	72,390	+ 55	+25,781
Equity items:							
Liabilities:							
Real-estate mortgages	6,586	6,534	6,484	6,117	5,635	− 14	− 951[5]
Non-real-estate debt:							
To principal institutions[6]	1,940	2,233	2,331	2,512	2,359	+ 22	+ 419
To others[7]	1,455	1,675	1,748	1,464	1,180	− 19	− 275
Proprietors' equity:							
Farmers' equity in non-real estate[8]	9,572	10,024	13,804	19,668	23,259	+143	+13,687
Landowners' equity in real estate	27,056	27,492	30,127	33,846	39,957	+ 48	+12,901
Total equities	46,609	47,958	54,494	63,607	72,390	+ 55	+25,781

[1] All figures are estimated, the margin of error varying with the items.
[2] As of April 1 each year.
[3] Includes only 40 percent valuation of passenger automobiles.
[4] Crops stored in unbonded warehouses escape inclusion either in inventory or warehouse receipts. Likewise commodities in bonded warehouses which are not covered by a CCC loan agreement escape inclusion in the estimate.
[5] Because of rounding, this figure is 1 million dollars less than a figure previously published.
[6] Gross; includes debt underwritten by CCC.
[7] Although these figures are believed to be reasonable, they lack supporting evidence.
[8] Includes intangibles.

Limitations and Peculiarities

Although providing numerous advantages, the consolidated balance sheet and the income statement for agriculture are subject to various limitations and they manifest certain peculiarities. Some relate to the logic of the statements *in toto*, others to faults or peculiarities of particular items.

In the first place the consolidated statements are like a mathe-

[3] The emphasis on the investment or saving or capital "carrying" function in lieu of the shelter function was suggested by my colleague E. Fenton Shepard.

matical average in that they cloak individual differences. Financial weaknesses of individual concerns become hidden and financially strong enterprises cannot be separately identified.

To offset this defect and to obtain a more adequate picture of the situation, a representative sample of balance sheets and income statements from individual farmers should be obtained so that frequency distributions of individual conditions may be ascertained according to location, types of farming, tenure, etc.

Another criticism of the use of the consolidated balance sheet concept for farming as a whole is this: Virtually all farms are operated as individual proprietorships. Creditors' rights in an unincorporated business constitute personal debts of the proprietors. Such debts extend to the entire personal estate of the debtor, and are not limited to the enterprise for which the credit is extended. In other words, the going concern concept does violence to the legal facts of the matter. Debts and assets of the individual proprietors in agriculture are not, in fact, limited to farming. Nevertheless the consolidated balance sheet for agriculture must be based on the going concern concept. Otherwise it would not be applicable to farming as such, but rather to individuals with various intersts in agriculture, some of a proprietary and some of a creditor-like character. Consolidated balance sheets for corporations escape this dilemma since the legal and business entitles are identical.

Some Particular Items

In addition to the foregoing limitations of the consolidated balance sheet and income statement for farming as a whole, there are numerous detailed technical limitations and peculiarities of the particular data used. A full understanding of these limitations or special characteristics of the data requires a study of the preliminary publications and recent releases of the *Income Parity for Agriculture* series.[4] Only a few of the points involved can be discussed in this paper.

The Balance Sheet. In the first place, tangible assets are valued at current prices received or paid by farmers for asset items in existing condition. Assets are not carried at original cost. The Bureau of Agricultural Economics accomplishes the general objective of maintaining valuations in current prices in various ways, depending on the asset item involved. This practice contrasts sharply with

[4] U. S. Dept. Agr.—a study started in 1936.

current practice of business accountants who usually value assets at the market price or cost, whichever is lower, or in the case of fixed assets at cost less depreciation.

The meaning of the valuation of certain items of the balance sheet and of the income statement must be interpreted in the light of the *method used in calculating depreciation*. The inventory items are depreciated at a constant average percentage of value remaining each year and not at a constant percentage of original value. Some expenditures for repairs are included with vehicle operation. Other expenditures for repairs, which in general cannot be isolated from expenditures for new structures or equipment, are added to the asset base each year before the depreciation rate is applied. The effect on both asset values and expense of operation is consistent in either case. The percentage rate is adjusted in the light of each decennial census. The method employed is readily sanctioned by practical considerations in obtaining data. The method is reasonably logical for dealing with the large volume of cases to be found in agricultural statistics. Certain farm-management specialists recommend the method for individual farms. It is said that maintenance and operating costs increase as depreciation charges and operating efficiency decrease. The expense of using equipment is said to be properly apportioned over time by this device. However, the effect of the method both on the valuations of the consolidated balance sheet and the expenses of the consolidated income statement should be clearly recognized.

Compared with straight-line methods, the use of a constant percentage rate of depreciation on remaining investment rather than on original investment increases expense in a period when a high proportion of inventory is new and reduces it as inventory becomes aged. The balance sheet valuations change in conformance with the dollar volume of depreciation charges. If the average age of the items of inventory remains constant at the midlife of all equipment, the results are almost identical with a straight-line method of calculating depreciation. But it seems well to inquire whether there is an adequate reason, as the method would imply, for 50 hours' use of a new tractor to cost a farmer several times more for depreciation that 50 hours' use of an old tractor. On the other hand, it is true that the sale value of used equipment drops abruptly in the first years of life of the equipment.

Were liquidation values sought, the method might be suitable

although the decline in book value in the initial years of life of equipment might even exceed the decline in resale values. This is a subject worthy of factual study. The use of liquidation values would negate the going concern principle. Fortunately in dealing with the mass of equipment of the United States in an over-all way, this problem is not acute. Nevertheless, the rate of purchase of new equipment is not uniform nor is the average age of equipment necessarily at midlife.

The valuation of the equipment on a current price basis is for the purpose of computing depreciation in such a manner that charges will be equal to the amount required at current costs to maintain existing equipment. This method has the effect of increasing depreciation in a period of generally rising prices and of minimizing depreciation in a period of generally falling prices. The cost of production is not represented in terms of dollars of original investment used up in the process of production. Over a long period of rising prices much more than actual investment in farming is charged off as an expense of production. The reverse would be true in a period of secular price decline.

The complete elimination from the balance sheet for agriculture of all asset and liability elements in which the CCC is interested, might be justified. Bank loans to farmers under the CCC plan are without recourse on the farmers. The commodities securing the loans will constitute full satisfaction of the farmers' notes. Moreover, the income statement counts farmers' receipts from direct or guaranteed loans of the CCC as income to the farmer. However, if the farmers' obligations to CCC were removed from the liabilities, a corresponding adjustment of assets would be necessary. The warehouse receipts, which would be the principal asset affected, could easily be eliminated. The remainder, in the absence of a direct measure, would have to be removed from crops on farms. The discrepancy in the data from different sources for CCC loans at times amounts to as much as 100 to 200 million dollars, so that the error added to the crop inventory might be 3 percent or more. Although not serious in its proportions, it is desirable to eliminate it. However, the removal of the CCC items should await more exact knowledge of the amounts involved.

The Income Statement. Practical considerations in obtaining data dictate the presentation of certain items in the income statement in such a way that the distinction between capital and operating trans-

actions is not clearly evident. The interrelation of purchases, inventory adjustment, expenses, and income is not shown in the customary manner of the income statement of a private business firm. Nevertheless, in the final analysis the results are somewhat the same as though a traditional income statement had been employed.

In the first place, the inventory adjustment appearing on the BAE income statement shows positive or negative changes during a given year in the market value, in terms of prices at the end of the year, of the increase or decrease in the quantity of crops for sale on farms and of the number of livestock whether or not for sale. This adjustment, which arises from the concept of national income used by BAE, is from an accounting viewpoint the logical corollary of the BAE practice of charging purchases in any period as an expense.[5] The inventory adjustment is a means for subtracting the cost of any unsold inventory out of expense and of adding such cost to the assets as of the end of the accounting period.

The method of inventory adjustment also is applicable to the continuous genetic elements of farming which are like manufacturing. This is the case with work stock, and breeding animals, and animals which are raised for their products like milk, wool, or eggs. Such animals, like machines, become less valuable with use. Thus the cows which constitute the "calf and milk factories" wear out in time. In such a case, as value declines, there is a negative influence on the inventory adjustment. Such a negative adjustment is equivalent to an entry for depreciation expense for the aging animals.

Since the inventory adjustment is in terms of prices as of the end of the accounting period rather than in terms of prices paid for goods held in the inventory, the influence on net income of price changes in the inventory items is entered on the record before sales have materialized. Conservative business accountants generally prefer to value the inventory at cost or market, whichever is lower. In so doing they allow declining prices to influence net income in the immediate accounting period but they do not consider the effect of rising prices until sales actually materialize. They "take their beatings" now but prefer not to "count their chickens before they hatch." As a practical matter the BAE practice appears more suitable for dealing with summary data for all of agriculture. The

[5] Horses and mules are included with "other operating expenses" rather than with "livestock bought."

method also is quite as logical as that of the more conservative business practice.[6]

The consolidated income statement departs from the logic of the balance sheet equation by the inclusion with production costs of interest on non-real-estate debt. In fact interest paid by a farmer is a return on someone's investment whether it be paid to mortgage creditors or to other creditors. The reason for retaining the interest on non-real-estate debts with production costs while treating mortgage interest as a distributive share is to maintain consistency with the present procedures used in estimating national income. A further difficulty with respect to the interest on the non-real-estate debt is the lack of a basis for estimating the interest on debt to miscellaneous lenders such as merchants, dealers, etc. A figure is included for such interest but it lacks a firm statistical basis.

Advantages

Despite the limitations to which the consolidated balance sheet is subject it is of considerable value in the analysis of the financial status of agriculture. The relative importance of changes in asset or equity items becomes evident. The capacity of the farm population to buy goods and services is roughly indicated. Comparative statements reveal changing interrelationships occurring with the passage of time. The extent of farmers' and nonfarmers' participation in agriculture is at least roughly shown. Changes in specific items of the balance sheet often have significance to the entire economy which becomes more evident in a balance-sheet setting.

Serving to focus attention on broad trends and relationships, the comparative consolidated statements subordinate minor elements and emphasize the major tendencies. For some purposes,

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[6] BAE often reports "realized net income" without inventory adjustment when the emphasis is on agriculture only and when the figure is for comparison neither with nonagricultural income nor with national income. In the long run the income to agriculture probably would be about the same by either method. Moreover, as O. C. Stine contends, the elasticity of demand for agricultural products in the mass at any one moment of time may be near unity. If so, it follows that the carrying of somewhat more or somewhat less inventory at any one time would not influence income in the least. Of course, this reasoning is inapplicable to the individual farmer who in general enjoys perfect elasticity of demand. In any case, variations of aggregate farm inventory are price-determining forces. Hence whatever the elasticity of demand, an inventory adjustment cannot be made at a price at which total inventory could be liquidated on a spot basis. The current price plus carrying costs under favorable conditions might be realized throughout a marketing period. In the opinion of the author the inventory adjustment is warranted by the objective of assigning costs to the accounting period in which income is given recognition.

especially in planning public policy, these major trends are quite as important as the detailed distribution of farms according to their financial condition and earnings. It is hoped that the consolidated statements not only will provide a basis for an over-all appraisal of the financial structure of agriculture, but will stimulate a study of the distribution of farms according to financial condition by location, type of farming, tenure, and other characteristics.

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Bureau of Agricultural Economics

TRENDS IN MAJOR CROPLAND USE IN THE UNITED STATES, 1909–1941

THERE is a widespread current interest in land utilization, land development, and agricultural productivity. The war years have demonstrated the enormous productivity of American agriculture even under somewhat unfavorable conditions. Proposals have been made for irrigation, drainage, and other land development in the postwar years. The possibility of postwar agricultural "surpluses" haunts many persons. The purpose of this brief note is to provide information on one aspect of this situation—a summary and comparison of related items that is not elsewhere available, as far as the author can learn.

The products from harvested cropland can be used for three broad general purposes: (1) to feed work animals, and hence be used for other agricultural production; (2) for sale abroad; and (3) for domestic consumption. Some of the potential cropland may be fallowed, or lie idle, or be undeveloped, or the crops planted there may be a failure. The crops harvested may be sold or fed to livestock, and the animals or their products sold. Either crops or livestock sold for domestic use may be used for direct human consumption or may be used industrially. More elaborate classifications, or classifications on more than one basis, could be made, but our threefold classification of use of harvested cropland has the merit of simplicity and usefulness. Elaborate calculations could be made of the acreages in each use, but relatively simple estimates will show the major trends.

The total area of cropland harvested increased slowly and rather steadily from 1909 to 1932, fell sharply in the drought of 1934, and stabilized from 1935 to 1941 at a level 20 to 30 million acres under

TABLE 1. USE OF CROPLAND IN THE UNITED STATES, 1909 TO 1941

Year	Cropland harvested		Volume of agricultural production exported[2]	Horses and mules on farms (Jan. 1)[3]	Acreage of cropland used for			Per capita cropland harvested for domestic consumption
	17 principal crops	46 crops plus 19 fruits and nuts[1]			Export[4]	Feed for farm work animals[5]	Domestic consumption[6]	
	million acres	*million acres*	*percent*	*thousands*	*million acres*	*million acres*	*million acres*	*acres*
1909	299.6	318.1	10	23,816	31.8	92.2	194.1	2.2
1910	305.7	324.2	13	24,211	42.2	93.7	188.3	2.1
1911	310.6	329.1	14	28,847	46.1	96.2	186.8	2.0
1912	309.1	327.6	14	25,277	45.8	97.8	184.0	1.9
1913	313.1	331.6	15	26,691	49.7	99.4	182.5	1.9
1914	314.4	332.9	10	26,178	33.3	101.3	198.3	2.0
1915	320.1	338.6	15	26,493	50.8	102.5	185.3	1.9
1916	320.9	339.4	17	26,534	57.7	102.7	179.0	1.8
1917	328.9	347.4	13	26,659	45.2	103.2	199.0	1.9
1918	341.2	359.7	18	26,723	64.8	103.4	191.5	1.8
1919	342.6	361.4	19	26,490	68.7	102.5	190.2	1.8
1920	338.0	356.5	14	25,742	49.9	99.6	207.0	2.0
1921	337.6	356.3	17	25,137	60.5	97.3	198.5	1.8
1922	333.6	352.2	14	24,588	49.3	95.2	207.7	1.9
1923	331.4	351.4	14	24,018	49.2	93.0	209.2	1.9
1924	332.9	352.7	16	23,285	56.5	90.1	206.1	1.8
1925	336.9	357.1	12	22,569	42.9	87.3	226.9	2.0
1926	335.9	356.1	13	21,986	46.3	85.1	224.7	1.9
1927	334.3	355.7	13	21,192	46.2	82.0	227.5	1.9
1928	338.2	358.9	12	20,448	43.1	79.1	236.7	2.0
1929	341.5	362.3	10	19,744	36.2	76.4	249.7	2.1
1930	344.9	366.4	8	19,124	29.3	74.0	263.1	2.1
1931	338.9	362.7	7	18,468	25.4	71.5	265.8	2.1
1932	344.5	368.9	8	17,812	29.5	68.9	271.5	2.2
1933	313.1	337.3	10	17,337	33.7	67.1	236.5	1.9
1934	276.1	301.3	8	16,997	24.1	65.8	211.4	1.7
1935	311.4	341.8	7	16,683	23.9	65.4	252.5	2.0
1936	294.6	321.0	6	16,226	19.3	62.8	238.9	1.9
1937	318.0	346.0	7	15,802	24.2	61.2	260.6	2.0
1938	316.3	347.1	8	15,245	27.7	59.0	260.4	2.0
1939	297.6	331.2	7	14,792	23.2	57.2	250.8	1.9
1940	300.5	339.7	5	14,481	17.0	56.0	266.7	2.0
1941	304.6	343.1	4	14,136	13.7	54.7	274.7	2.1

[1] Data for 29 crops and 19 fruits and nuts not given prior to 1919; estimated as 18.5 million acres annually for earlier years.

[2] 1909 to 1936, in Agricultural Situation, Sept. 1937, p. 23. Recent years estimated on basis of value of exports.

[3] Agricultural Statistics, 1942, Table 579, page 450.

[4] Obtained by multiplying the volume of exports by the total acreage of cropland harvested.

[5] On the basis of 3.87 acres of cropland (in addition to pasture) required per horse or mule. Technology on the Farm, a special report of the Department of Agriculture, August, 1940 estimates (p. 44) that 5.8 million acres of cropland will be released by a reduction of 1.5 million head of horses and mules.

[6] Difference between total cropland harvested and that needed for export plus feed for work animals.

under the peak (table 1). The increase in acreage occurred largely in the Great Plains, and the decline was largely there also, although changes occurred elsewhere, notably in the South. The acreage of land in fallow and idle rose somewhat while the acreage of harvested cropland was increasing, and rose sharply as the latter declined.

The number of horses and mules on farms rose slowly from 1909 to 1918, and since then have declined to not much over half of their peak numbers. The number of horses and mules not on farms —in cities and elsewhere—probably followed a generally similar course. The influence of the truck and the tractor is evident. There has probably been some increase in riding and other pleasure horses in recent years, but the numbers involved are small compared with the decline in workstock. On the assumption that the rate of feeding and crop yields have remained constant, the acreage of harvested cropland required to produce feed for farm horses and mules has declined almost 50 million acres since 1918. Other estimates place this figure as high as 60 million acres. Further declines are in prospect for the postwar years, when tractors become freely available again. As there will always be some work animals on farms, this shift cannot replace an equal acreage in the future. The change from animal to mechanical power has been virtually completed in the cities; it probably freed from one-fourth to as much cropland as has been freed by the shift in source of farm power.

Agricultural exports had been declining prior to World War I, but rose sharply then. Since 1919, exports as a percentage of total agricultural production have fallen steadily. They continued to fall after World War II began in Europe and until we entered the war. It has been assumed that the acreage of harvested cropland was in proportion to the volume of exports; some exports, like tobacco and fruit, require little cropland, but others, like wheat, require a great deal. A more precise estimate could have been made, at the cost of considerable effort, by considering the exports of each commodity. The general importance of exports, in terms of cropland, are fairly well shown, however. The decline in exports from 1919 to 1941 freed about 50 million acres. The causes of the decline in agricultural exports are complex; our unwillingness to admit imports and thus provide exchange, our determination to hold prices above world levels, the shift in comparative advantage which permitted our industrial products to compete on world markets

more effectively than our agricultural products, and, perhaps above all, the extreme nationalism in some normally importing nations which were determined to become self-sufficient. The postwar outlook is uncertain, and depends largely on international political arrangements. On the one hand, exports could not decline to release more than 15 to 20 million acres used for exports after 1934; at the other extreme, few expect them to increase enough to require more than perhaps 20 million acres above the level of those years.

Deducting the acreage used for farm work animals and for export, the acreage of harvested cropland used for domestic consumption rose from less than 200 million acres prior to 1920, to well over 250 million acres after 1937. The increase was fairly regular from about 1916 to about 1932. There was a sharp decline to 1934, and recovery since to about the 1932 peak. As a residual item, this figure is subject to any errors introduced elsewhere, and includes a variety of uses. If feed for non-farm work animals could be excluded, the remainder would show an even steeper upward slope. If reduced to a per capita basis, the acreage of cropland harvested for domestic consumption has been remarkably constant since 1909, varying from a low of 1.7 acres to a high of 2.2 acres, and with no perceptible trend upward or downward. Only 8 out of the 33 years had less than 1.9 or more than 2.1 acres per capita of cropland harvested for domestic consumption.

If we regard the mechanization of American agriculture and the loss of major foreign outlets for agricultural commodities as two episodic events, occurring contemporaneously largely from fortuitous causes, then obviously from these causes we could not continue to secure a constant area of cropland harvested per capita if our population continued to increase at an undiminished rate. Further mechanization and continued loss of export markets might add 40 to 50 million acres for domestic consumption, compared with the 1935-39 years. This would maintain the per capita figure constant for an additional 20 to 25 million people, or to a total population of 155 to 160 million people. Irrigation and drainage enterprises might some day add as much as 50 million acres (though at rather heavy cost), or would maintain the per capita figure for another 20 million people (assuming some work animals on these new lands). According to present population forecasts, the population of this country is likely to reach a peak at less than 175 to 180 million people. The per capita acreage of harvested cropland

for domestic consumption can therefore remain constant, if we so desire, and if all of the above adjustments are made.

Why should we seek to maintain a constant per capita acreage of cropland harvested for domestic consumption? Preoccupation with acreage ignores the other dimension of production—output per unit of area. Consideration of the extensive margin of production should not blind us to the intensive margin. Increased use of fertilizer, improved varieties and breeds, and more intensive rotations and feeding practices can substantially increase total output from the same area. It may be cheaper to do so, than to increase the area in cultivation. The war has given us some hint of possibilities in this direction. With ample machinery, labor, fertilizer, and other supplies, agricultural production can be stepped up materially on the present area, if agricultural prices warrant. The major change in cropland use over the next 2 or 3 decades is likely to be increased intensification. This will be particularly striking on our better soils and in our better farming areas.

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A POSTWAR FORWARD PRICING PLAN FOR AGRICULTURE

FORWARD pricing is one of the most promising ideas which has appeared in agricultural economics in recent times. It recognizes the true function of price, namely, that of directing the uses of productive resources in response to the desires of all people and to the changes in the state of technology. Furthermore, it is the nearest thing yet devised to answer the farmer's greatest need and desire—a price which he can use as a basis for his planning.

Agricultural prices in the past have not been very effective in directing the uses of agricultural resources because the prices at the time of planning were not a reliable indication of the prices at the time of marketing. Consequently, the farmers to a large extent based their production plans on other factors. One of the reasons for this lack of reliability is the violent price fluctuations resulting from short-run factors. As a result, the long-run trends of prices, which should be the primary basis for planning, were not

recognizable. The long-run trends reflect the changes in the peoples' habits and tastes, the changes in the agricultural production technology, the discovery of new uses for agricultural products, the discovery of substitutes for agricultural products, and the expansion or contraction of the various sections of the agricultural economy. The influences of these factors should provide the foundation for the prices used by the farmers in their planning, the short-run factors exerting minor effects.

Several things must be achieved in any forward-pricing plan before it can be effective. The prices must be set before the farmers plan their production programs, and they must be guaranteed until the farmers have an opportunity to harvest and sell their commodities. In addition to guaranteeing the prices for the production period, the rate of change of the guaranteed-price must be kept within limits in order that the farmers would have some idea of the price to expect in the near future. Also the guaranteed-price must be free to move in response to the activities in the market place and must not be restricted or controlled by any group of individuals. These conditions must be achieved before it is possible for the dynamic forces of society to direct the economy toward a proper equilibrium without the wastes associated with drastic adjustments. A perfect equilibrium can never be achieved by a dynamic society, but at any given instant there is a set of conditions which would represent a true equilibrium. It is toward that condition which society must always be working and the market place is the best guide yet conceived by man toward that goal.

The basic points of the proposed forward pricing plan for agriculture are as follows:

1. The government guarantees a price for each agricultural commodity which can be stored.
2. The guaranteed-price would be determined automatically by the behavior of the market but the amount of change in any year or productive period would be limited to a certain maximum percent of the previous price.
3. The maximum percent change at any one time would depend upon the amount of the commodity that the government has in storage at the time. The maximum percent decrease in the guaranteed-price would be a direct function of the amount in storage, whereas the maximum percent increase would be an indirect function.

4. The guaranteed-price would be different for the various grades of a commodity and also for the different sections of the country.
5. The government would buy an unlimited quantity of any commodity at the guaranteed-price whenever the market could not absorb the supply at that price.
6. The government would sell as much of any commodity as the market would absorb whenever the market price exceeded the guaranteed-price by a certain percent. This percent would provide a range in price when the government would neither buy nor sell, thus eliminating a large number of transactions.
7. The guaranteed-price would be changed every six months, year, or whatever period is most in agreement with the production technology of the particular commodity.
8. The various percent changes in the guaranteed-price and their relationship to the government stocks would be different for each commodity.

The commodities to which the plan could be applied include all those which can be stored satisfactorily. At the present time they would include most of the grains, hay crops, and fiber crops. Also, many products can be processed and stored in that condition, for example, dried eggs. In the future many other commodities very likely could be included as storage and other techniques improve. It is only necessary that the commodity can be stored for a year or two because the government stock can be sold and replaced with fresh stock each year if necessary. Livestock is not included but it may be possible to include them indirectly by guaranteed prices of products processed from livestock. Also, the livestock producers would benefit from the stabilized prices of livestock feeds.

The prices guaranteed by the government would not be determined by any group of individuals but they would move up and down in response to the supply and demand of these commodities. The rate of change, however, would be limited to certain percentages of the previous guaranteed-price. In that way, the short-run factors could never cause any drastic changes in the prices hiding the influence of the long-run factors. Also, it would provide the farmers with the necessary time to make adjustments without serious hardships to them. The farmers would have not only a definite guaranteed-price for one production period to use as a basis for their planning but they would have also a guaranteed-price fan (table 1) which would indicate approximately what prices they could depend upon during the next two or three years.

The shape of the guaranteed-price fan would depend upon maximum percent changes permitted at any one time, or in other words, the maximum rate of change allowed. At this stage it is impossible to give any definite figures for these maximum percent changes except for illustrative purposes, but it is possible to set forth the principles which must be considered. They must be large enough to achieve the necessary adjustments in production over a period of time. In the early stages these changes would need to be larger than they would later. After the plan had been in operation for some time, the farmers would become more sensitive to changes

TABLE 1. HYPOTHETICAL GUARANTEED-PRICES FOR A COMMODITY ASSUMING AN INITIAL PRICE OF $.80 PER BUSHEL AND 7 PERCENT MAXIMUM PRICE CHANGES

Year	Guaranteed-Price	
	Rising market	Falling market
0	$.80	$.80
1	.86	.74
2	.92	.69
3	.98	.64

in price because they would realize more and more that they actually meant something definite. Also the farmers would become more familiar with the alternative uses of their resources. The maximum changes in the guaranteed-prices must be so related to the supplies of the commodities that an adequate stock of each is maintained to protect the consumers and to prevent any unjustified expansion of production. Too high prices can easily do as much or more harm to a sector of the agricultural economy as too low prices. Furthermore, the changes must be small enough to provide a reasonable stability of farm income. It may be difficult to accomplish both the first and the last because they are competitive but a satisfactory balance should be possible. That is, maximum price changes which are large enough to cause the necessary changes in production should not be so great that there would be an inadequate stability of farm income.

In order to illustrate the guaranteed-price fan a set of hypothetical figures will be used. It is assumed that the initial guaranteed-price is $.80 per bushel and that the maximum percent price change is 7. The results under these conditions are shown in table 1. During the current year or production period the farmers would be

assured a minimum price of $.80 per bushel. Next year he would know that the guaranteed-price would not be above $.86 nor below $.74 per bushel. After three years the guaranteed-price would not be less than $.64 even though the supply greatly exceeded the demand. If the trend indicated that there is need for a shift in the use of the productive resources to some other commodity, there would be time to make the shift without the waste of resources which accompanies rapid changes. If the demand exceeds the supply, the guaranteed-price would rise but at the end of three years it would not be more than $.98 per bushel. At best, the production of the commodity would not be expanded beyond the amount which would be compatible with this guaranteed-price. The actual price may be considerably above the guaranteed-price if the government stock of the commodity became exhausted, but there should always be an ample reserve. Without it, the plan cannot be effective. This illustration is not wholly realistic because the effect of the varying size of the government stock of the commodity is not considered.

There are two steps in the establishment of the relationship between the rate of change of the guaranteed price and the stock or reservoir of the commodity held by the government. The first is to set the limits of the government stock desired. The lower limit would be the amount considered necessary to prevent the price from going too high. The upper limit would be the amount above which any more would be only a storage cost and would serve no useful purpose. For purposes of illustration it is assumed that for wheat (including all kinds) these limits should be from 200 million to 300 million bushels. If the stock held by the government should fall below 200 million bushels, the guaranteed price should not be decreased even though the government may have had a net purchase during the year. Also, if it should become greater than 300 million bushels, the guaranteed price should not be increased even though the government had a net sales during the year.

The second step would be to establish the magnitude of the change necessary to bring about the desired adjustment in production. This step is the most difficult one in the development of the plan, and it is very probable that they would need to be revised after the plan had been in effect for some time. In table 2 it was assumed that 7 percent was about the necessary maximum rate of change unless the amount in government storage exceeded 500 million bushels.

TABLE 2. PERCENT CHANGES IN THE GUARANTEED-PRICE OF WHEAT AT DIFFERENT LEVELS OF GOVERNMENT STOCKS

Government stocks Bushels (000,000)	Maximum percent increase in guaranteed-price	Maximum percent decrease in guaranteed-price
0	7.0 cents	0
100	3.5 cents	0
200	0	0
300	0	0
400	0	3.5 cents
500	0	7.0 cents

In the actual operation of the plan it would be necessary to differentiate each commodity according to kind, grade, and place. These kinds and grades would be essentially those which now exist in the different places except that the grade must be such that the commodity can be stored. The number may be reduced if such reduction would not impede the operation of the plan but would reduce the administrative cost. The same general principle would guide the number of places where the government would buy and sell its commodities. This number also would be dependent upon where the commodity is consumed. If it is fed to livestock, the number would be much larger than when the commodity is processed in some factory, for example, cotton. The size of the government stock in relation to the percent changes in the guaranteed-price (table 2) would be broken into place, kind and possibly grade. This might be done by the use of a 5, 7, or 10 year moving-average of the production in the place in question. The use of a moving-average would take into consideration the effect of shifts in production in the different areas.

The selection of the initial differentials in the guaranteed-price for the different combinations of place, kind, and grade is not a serious problem. They would right themselves after the plan had been in operation a few years. For example, if the guaranteed price at Fargo, North Dakota, is too high relative to Lincoln, Nebraska, the government would buy the commodity at Fargo before it would at Lincoln. As a consequence the guaranteed-price at Fargo would drop before it would at Lincoln. Or under a different set of circumstances the government might sell at Lincoln and not at Fargo, thereby increasing the guaranteed-price at Lincoln. Thus, the guaranteed-prices for the different kinds and grades in the different places would become properly adjusted in a short time.

A range between the guaranteed-price and the price at which the government would sell is necessary. It would permit the prices to fluctuate slightly so that the strength of the market is more easily recognizable. Also, it reduces the number of purchases and sales made by the government. Most important reason, however, is that it makes it possible to lower the guaranteed-price without assuring the buyers that they can obtain the commodity at a price lower than the previous guaranteed-price. Otherwise, as the time for changing the guaranteed-price approached and it was evident to everybody that the guaranteed-price would be lowered, the buyers cease to buy. They would wait until the change was made and buy from the government at the lower price. Therefore, in a falling market the price at which the government sells must be at least equal to the previous guaranteed-price.

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REVIEWS

The Road to Serfdom, Friedrich A. Hayek. Chicago: University of Chicago Press, 1944, Pp, xii, 250. $2.75.

This small volume, its author states at the outset, is simply an expanded version of a pamphlet published some five years earlier in the University of Chicago "Public Policy" series. It is still a piece of pamphleteering—"a political book," Hayek calls it, but with a message "derived from certain ultimate values." Thus it is pamphleteering at its best. "I can discover no reason," says the author, "why the kind of society which seems to me desirable should offer greater advantages to me than to the majority of the people of my country."

The proposition which Professor Hayek seeks to burn into the consciousness of English and American readers may be quite fully stated in a few sentences:

> The author . . . has become increasingly convinced that at least some of the forces which have destroyed freedom in Germany are also at work here and that the character and source of this danger are, if possible, even less understood than they were in Germany. . . . Few are ready to recognize that the rise of fascism and naziism was not a reaction against the socialist trends of the preceding period but a necessary outcome of those tendencies . . . Many who think themselves infinitely superior to the aberrations of naziism and sincerely hate all its manifestations work at the same time for ideals whose realization would lead straight to the abhorred tyranny. . . . If we take the people whose views influence developments, they are now in the democracies in some measure all socialists. . . . Is it not possible that if the people whose convictions now give [the "planning" movement] an irresistible momentum began to see what only a few yet apprehend, they would recoil in horror and abandon the quest which for half a century has engaged so many people of good will? (pp. 3–5)

The author has probably weakened rather than strengthened the effect of his book by loosely identifying dictatorship, totalitarianism, socialism, and "planning" as one and the same. At times even "organization" is included. All these divergent forms of political structure and functioning are indiscriminately put beyond the pale of creatively free individualism, which Professor Hayek makes the heart and soul of Western civilization and/or "nineteenth century liberalism." At many places "Western" is made arbitrarily to mean west of the Rhine, although its ingredients are said to include "Erasmus and Montaigne, Cicero and Tacitus, Pericles and

Thucydides" as well as the basic tenets of Christianity. From the liberal pattern of Western life, Germany in particular was cut off by the mere fact that it was occupied by a people peculiarly fitted to elaborate the socialist doctrine, to put it in practice, and to carry it to its logical extreme of fascist dictatorship. In spite of the argument that this happened because the Germans were German, Hayek is deeply alarmed that any active resort to Government as an organizing agent in human affairs will also put non-Germans, and even the sturdiest of Anglo-Saxons and the cross-bred pioneer stocks of the United States, on the swift descent to totalitarianism, from which, after the first few short steps, turning back is extremely difficult if not impossible.

The reviewer, as a notorious defender of private enterprise and one who himself has viewed with alarm some of the more ambitious "action programs" and easy reliance on fiscal policy as the means to economic security, might by some be expected to put himself in full support of Professor Hayek's argument. On the contrary, the book seems to me to be seriously lacking in realistic recognition of many grades of social control that in fact conserve individual freedom. I find difficulty also in accepting as valid his standard of economic purity from which a society must not at all depart if it is to keep from being drawn into the whirlpool of socialism-made-synonymous-with-totalitarianism. Hayek's norm is extreme economic individualism in the *milieu* of a free market operating automatically under the sway of some wholly objective and impersonal law of competition.

It might seem unbelievable in the present day, when both technological and organizational evolution have advanced to the stage that they have, that we should find a full throw-back to atomistic competition presented as both practicable and preeminently desirable. Yet here we find that proposition in cold and unblinking print. Professor Hayek can see no safe and desirable middle ground of intelligently co-operative group organization, primarily private and based on free choices but within the setting of public institutions democratically shaped on the anvil of progressive experience.

> If we are rapidly moving toward a state . . . of everything being directed from a single center . . . this is largely because most people still believe that it must be possible to find some middle way between "atomistic" competition and central direction. Nothing, indeed, seems at first more plausible, or is more likely to appeal to reasonable people, than the idea

that our goal must be neither the extreme decentralization of free competition nor the complete centralization of a single plan but some judicious mixture of the two methods. Yet mere common sense proves a treacherous guide in this field. Although competition can bear some admixture of regulation, it cannot be combined with planning to any extent we like without ceasing to operate as an effective guide to production. Nor is "planning" a medicine which, taken in small doses, can produce the effects for which one might hope from its thoroughgoing application. Both competition and central direction become poor and inefficient tools if they are incomplete; they are alternative principles used to solve the same problem, and a mixture of the two means that neither will really work and that the result will be worse than if either system had been consistently relied upon. (pp. 41–42)

One might at first glance think this difficulty happily resolved in the next sentence, since it accepts the idea of "planning for competition." But this easy compromise has to be abandoned as one realizes with every fresh page that the author still means "planning for [atomistic] competition." Even his admirable disavowal of "the wooden insistence of some liberals on . . . the principle of laissez faire," while it seems to permit social consciousness to operate usefully in the betterment of legal and administrative institutions should, in the author's view, shape those institutions to the primitive conditions of literal individualism or—one fears, in view of the realities of industrial life—to the "rugged individualism" of the late 19th and early 20th centuries.

Americans must find poignant the author's references to his successive politico-economic experiences in Austria, Germany, and even present-day England. But one gets an uneasy feeling also that the acuteness of his dread of any use of government as a co-ordinating agent suggests traces of shell shock. In the American idiom of Mark Twain, "Did he not get more out of the experience than there was in it?" We in America have every reason to listen to the voice of experience and not let our national youth, our relatively easy economic situation, and our separate geographical position lull us into careless confidence. But Professor Hayek's warnings would probably prove more effective if he did not try to prove too much.

This "too much" touches two points. First, I think he overstates the power of any and all types of social organization to take on the malign form of coercion and become the road to serfdom. After all, you can have even an army—and a highly efficient army—without having the goose-step, the Prussian officer code, or the butcher-boy

behavior of "elite" troops. One cannot appraise fairly the power of America to impose social discipline upon herself without a minority opposing the majority, unless he ponders carefully the native character of our people and the institutions of freedom we have built. Times change surface appearances, but Broadway of 1945 felt immediate kinship with the heroine of *Bloomer Girl* and made spiritual response to its hit song "The Eagle and Me." No less genuinely does it interpret the theme of that other current favorite, "Don't Fence Me In," into the "organized" situations of factory and office and chain store.

I believe the author may hold his darkest fears in abeyance so long as the boys of the Fourth Estate and the radio commentators stand up to be counted as the Patrick Henrys of free speech. He may well study also the position of Wendell Willkie and Senator Vandenburg in the American scene, the make-up of our delegation to the San Francisco Conference, and the fact that we found no difficulty in holding the International Civil Aviation Conference during the closing days of a presidential campaign.

Second, Professor Hayek proves too much as to the need of "going back" to atomistic competition if we are to escape serfdom through socialization of economic life. In spite of his broad historical knowledge, he seems to cherish a quaint idea that perfect competition is a lost Eden, not a figment of the theorist's imagining, and that "nineteenth century liberalism" was a practical achievement rather than a minority crusade. With this false historical perspective, he faces the future with blank disbelief in any possibility of a good society being conducted on a pattern of administered prices, with the administrative agents having trained intelligence and self-restraint or being responsibly controlled by the members of their organizations. Obviously we have not attained perfection or even assured safety under such a system. But may not more good be accomplished by study and education designed to better that performance than by wailing over the admitted horrors of fascist serfdom or rhapsodizing over the beauties of an unattainable competitive automatism? Whoever reads this book might usefully follow with a careful reading of Charles Merriam's *Public and Private Government.*

All this may seem remote from agricultural economics. But every agricultural economist who has watched the growth of agrarianism in the last few decades and particularly the emergence of the Fed-

eral Farm Board, the Agricultural Adjustment Administration, the FCA, the REA, and other regulatory and action developments will find in it much that he can readily translate in terms pertinent to his particular field of work. This is true also of those whose special field of interest concerns the "voluntary" agencies of the co-operative movement. It may well give pause to those who have been disposed rather uncritically to ride "the wave of the future" and who think that the tough problems of agriculture can be solved by the short-cut method of turning them over to the central government. But it would be of still more use if it stimulated agricultural economists to struggle harder to demonstrate that it is possible to adjust the economic lives of farmers and of their organizations soundly—and without loss of independence—into the functioning of an advanced industrial society.

EDWIN G. NOURSE

The Brookings Institution

The Reconstruction of World Agriculture, Karl Brandt. New York: W. W. Norton and Company, 1945. Pp. viii, 416. $4.00.

Here is a most timely book on a topic of vital, current interest by an author who has had unusual opportunities for obtaining a broad perspective of the problems with which it deals. Dr. Brandt's training in agricultural economics in Europe and his experience as a member of the faculty of the University of Berlin and as the director of the German Institute of Agricultural Market Research have given him first hand contacts with economic aspects of European agriculture. His broad and varied experience on this side of the Atlantic since coming to America has rounded out his preparation for the task. His acquaintance abroad and his connections with the Food Research Institute have aided him in tapping sources of information regarding European agricultural conditions during war which are not accessible generally. The high expectations which these considerations warrant are well met by this volume.

The first three chapters review the effects of the last world war and trends during the two decades between wars. Dr. Brandt's critical review of inaction or improper action after World War I and during the depression is worth careful study as an aid to effecting improvement in future policy.

The analysis of the developments during the present war represents a real contribution to the published material available on

this subject. Many Americans are prone to think of Europe as an area heavily dependent upon overseas food supplies, overlooking the fact that the continent has surplus as well as deficit areas. The author shows how the conquests by Germany enabled the Nazi to integrate and reorganize the agricultural production of various parts of Europe to increase its self-containment. This analysis includes an interesting, areal classification of Europe into "rings of supply." It is on the basis of this appraisal that the author has held consistently throughout the war to the view that "the Axis cannot be defeated by food shortage, but must be defeated on the field of battle" (page 118). This is reaffirmed in a subsequent statement that "neither Hitler nor Tojo and their gangs will lose their war because they run short of food. They will lose their war precisely as the Central Powers lost World War I, by a crushing military defeat in battle" (page 197).

Food requirements and adjustments during the demobilization period are considered next. Relief needs are presented and considerable attention is given to the functions and operations of UNRRA. In appraising prospective needs, the author comments that "it is utopian to approach the question of European relief requirements from blueprinted standards of nutrition" (page 201). He goes on to say "The only approach to a practical compromise on the definition of 'requirement' is to proceed from the habitual annual food consumption in normal times and the food imports during such periods."

The last four of the ten chapters are concerned with agricultural policies and adjustments for the future. Basic issues are reviewed. The importance of world trade is developed in some detail. Some readers may feel that Dr. Brandt underestimates the obstacles to a gradual but significant reduction in trade barriers but students of the problem will share the hope that this will be accomplished. He is realistic in recognizing that public policy cannot be unmindful of vested interests which restrictions have fostered.

The author does well in reminding Americans of the responsibility which rests upon this country as the leading power in the world. He says that "If America does not live up to the obligation of bold leadership involved in the position she acquired in World Wars I and II, she will sooner or later lose her position by default" (page 307). The general conclusion with respect to international commodity agreements is that "Political agreement on export quotas can

never fully maintain the beneficial effects of international trade on the basis of comparative advantage and competitive price" (page 317).

The titles of the closing chapters, "Orientation for Reconstruction" and "Reconstruction in Selected Countries" suggest the type of problems to which they devote attention. The farmers' interests in nonagricultural activity and employment and in improved nutrition are recognized. The importance to agriculture of the political and economic future of Europe is pointed out. The need for coordination of economic policy on the continent if planning to satisfy national groups is to be avoided is made clear. The author's concern over the narrow selfishness which so often dominates pressure groups certainly is justified.

This book must be accorded a high ranking in the literature relating to agricultural policy. It deserves close reading and careful study by agricultural economists, farm leaders and all others seriously concerned with agricultural welfare and sound farm policy.

O. B. JESNESS

University of Minnesota

Economic Problems of Latin America, Edited by Seymour E. Harris. New York: McGraw-Hill Book Company Inc., 1944. Pp. 465. $4.00.

This very timely book on current economic problems of Latin American countries includes chapters by seventeen economists. Edited by Seymour E. Harris who also contributes three chapters, this book brings together in one volume an analysis of current economic developments and problems of Latin America by economists who have had the opportunity of traveling and studying problems in these countries.

The book is divided into three parts. Part I is an introduction by Seymour E. Harris in which he discusses some major issues including the relatively low standard of living and the dependence of Latin American countries on trade with foreign nations. Problems of price stabilization, labor problems, scarcity of capital and other major problems are mentioned and briefly analyzed.

Part II, under the title "General Considerations" contains seven chapters. A chapter on "Economic Problems of the Latin American Republics" by Frank A. Waring includes a valuable discussion and statistics on foreign trade of Latin American republics. "War

and Postwar Agricultural Problems of Latin America" are analyzed in a chapter by L. A. Wheeler. Trends in the production and exports of leading farm products are discussed. Robert Triffin in a chapter on "Central Banking and Monetary Management in Latin America" outlines the present central banking structure in Latin America and makes several suggestions for improvements in monetary management. "Fiscal Policy and the Budget" is the subject of a chapter by Henry C. Wallich. Customs and internal excise taxes provide most of the revenue of the governments. Corporate and income taxes provide only minor revenues. The heavy dependence on foreign trade makes it difficult to stabilize the economy by fiscal means. In two chapters, one on "Price Stabilization Programs in Latin America" and another on "Exchanges and Prices," Seymour E. Harris presents an excellent analysis of inflation control in the Latin American countries. Price control has not been successful on the whole, and inflation is a very serious problem. Exchanges have been controlled and the techniques and effects of such controls are outlined. "Inter-American Trade Policy" by Henry Chalmers is the concluding chapter of Part II. This chapter includes a fine general historical summary of proposals and programs for promoting trade between the United States and Latin American countries. Increased purchases of Latin American commodities by the United States during the war has maintained the export trade. Fuller and freer trade among all American countries is the objective of many policies which have been proposed.

Part III includes the following special country studies: Argentina by Miron Burgin, Bolivia by William A. Neiswanger and James R. Nelson, Brazil's Economy in the War and After by Corwin D. Edwards, Chile by P. T. Ellsworth, Columbia: with Particular Reference to Price Control by Ben W. Lewis and Henry Beitscher, Cuba: Sugar and Currency by Henry C. Wallich, Haiti by Don D. Humphrey, Mexico: with Special Reference to Its International Economic Relations by Norman T. Ness, Paraguay: with Particular Reference to Price Control by George R. Taylor, and Venezuela by E. G. Bennion.

The ten countries discussed under Part III include 80 percent of the population and 90 percent of the area of Latin America. In general the discussions include a description of the resources, production and trade of the countries and an analysis of current economic problems including the impact of the war upon the economy.

At this time, when there is a growing interest in the problems of Latin American countries, this book meets a need for information on current economic developments in these countries. The reader will find some repetition which perhaps is unavoidable in a book with chapters written by several persons. However, the material on the whole is presented in a clear logical manner. Current developments and policies in Latin America are subjected to careful economic analysis by experts in various fields who have had close contact with the problems discussed. This makes "Economic Problems of Latin America" particularly valuable as a text and reference in college courses dealing with economic developments and economic problems of Latin American countries.

E. C. JOHNSON

United States Department of Agriculture

The Production Credit System for Farmers, Earl L. Butz, Washington, D.C.: The Brookings Institution, 1944. Pp. vii, 100. $1.00.

This book covers the legal foundation and is a statistical and analytical discussion of developments during the first ten years of production credit under the Farm Credit Administration, created by Executive Order of the President in May 1933. It deals specifically with (1) The Production Credit Division of the national Farm Credit Administration; (2) the twelve Production Credit Corporations, one in each FCA district; and (3) the more than 500 production credit associations organized to serve the production credit needs of qualified farmers throughout the country. The origin, functions, financing, growth, sources and amount of incomes, and the progress of the Production Credit system toward farmer ownership are examined in the first four chapters. In the last four chapters, attention is focused on how well the system has fulfilled its mission, the amount of federal subsidy used, the effects of the subsidy and the outlook for its reduction or elimination. Current operating problems and criticisms that the Production Credit system is an undesirable extension of activity into the banking field and that federal subsidy constitutes unfair competition with commercial banks receive major attention. It is recognized that "money spent by government in promotion of the general welfare must, in its final impact, subsidize someone whose position in the competitive struggle would otherwise be less favorable."

Conditions in the early 1930's which were the occasion for gov-

ernment subsidy of the Production Credit system, were the collapse of credit in rural banks and the lack of local points of contact through which the loan facilities of the intermediate credit banks and regional agricultural credit corporations were available to the average farmer. After the credit collapse of 1929–33, farmers did not have the capital necessary to set-up discounting organizations without material financial support. The Production Credit system was established by Congress for the purpose of making short-term credit available to farmers on a permanent basis in a form adapted to the varying productive processes, and at the lowest rate of interest consistent with sound business principles. Dr. Butz maintains that it was never the intention of Congress or of the FCA to regard the credit associations as "emergency institutions whose operations would be terminated or restricted with the passing of the agricultural emergency during which they were born." On the contrary, the system was intended to be "another credit system designed to serve the peculiar and continuing production credit needs of agriculture."

One of the special merits of the book is the inclusion of considerable factual data not readily available, with regard to the relation of subsidies to the capitalization, earnings, loan fees, interest rates, etc. of production credit associations. In addition to information currently published, these data are necessary for analysis and evaluation of PCA operations. The percentage of capital stock owned by members increased from 9.9 percent in 1935 to 26 percent in 1943. In 1935 the government had invested in A stock $76,802,550 and in 1943, $75,770,460. During the same period, legal reserves and surpluses of the associations increased from 3.5 to 27.9 percent of total capital. The volume of loans increased from 107 million dollars in 1934 to 501 million dollars in 1943, but the number of loans, nearly 246,000, reached its peak in 1937. In 1943, the associations made loans to about 7.5 percent of all United States farmers that used production credit. Losses have been small during the first ten years of operation (0.16 percent of total cash advances). The tendency of some associations to "live up" income from member and from government owned capital is noted, but substantial progress has been made in building production credit associations capable of supporting themselves. Sixty-three percent of the associations were operating within member income (before losses) in 1943.

In an appraisal of the job done by the Production Credit System, Dr. Butz concludes the system provides short-term credit in the form necessary to meet the peculiar needs of qualified farmers at a reasonable cost in all areas, whereas adequate credit had not been available before at any cost. It is in a position to continue furnishing credit under all sorts of business conditions, because its loan fund is not subject to withdrawals by depositors, and in addition, it has access to the money markets of the country. The subsidy is justified as necessary to nurture the Production Credit system through its foundling years, and the competitive effect is said to be less serious than is sometimes alleged. The aggregate benefit of the system is many times the value of the Treasury subsidy. "The real threat to commercial banking inherent in the subsidy is not so much the amount of the past or present subsidy, but the philosophy underlying continuous subsidy and the genuine danger that it may be extended to the point where both private and cooperative credit institutions will be forced out of the farm loan field."

In the last chapter, entitled "Can the Subsidy be Removed?" the author points out that Congress contemplated that the production credit associations would, after a reasonable period, become independent local cooperatives, but continue to enjoy the benefit of an overhead service organization maintained at least partly by government expense. It is shown that many of the PCA's are now in position to retire most of their government capital and in a few cases this has been done. If the associations located in high cost loan areas were permitted to adjust their interest rates and loan service fees in line with costs, more rapid progress could be made. However, a few associations located in sparsely settled regions, high risk areas, or districts having small loans may never be able to live within member income. "If the decision is made to rely permanently on the subsidy in such areas, the system can never be entirely farmer-owned and farmer-controlled and the pressure will persist always to include additional marginal areas in the subsidized group."

It is recommended that a definite program be set up and followed for retiring government capital in the production credit associations. Since this is an administrative problem, criteria for a retirement program "which should be helpful in gauging the extent and rapidity of retiring government capital" are proposed and discussed, but not the program itself.

Your reviewer is impressed by the amount of pertinent information contained in this 100 page book, and especially by the logical order of presentation and penetrating analysis. With regard to controversial issues, the exposition is sufficiently tolerant to leave some basis for the contentions of critics of the Production Credit system. The author does not hesitate in most instances to take a positive stand, but his proposals do not have an air of finality. Certainly his analysis suggests many questions which farmers, students, bankers, and all persons interested in the public welfare should consider carefully in order to decide wisely the principles to be followed in the broader field in which the Production Credit system is a small but significant sector.

BUEFORD M. GILE

University of Louisiana

Bread and Democracy in Germany, Alexander Gerschenkron. Berkeley: University of California Press, 1944. Pp. 289. $2.75.

This scholarly study has been oriented toward an eminently practical goal: to contribute a workable treatment for the problem of the German Junkers in the future peace settlement. Its main value and accomplishment lies, perhaps, more in analyzing the economic position and economic policies of the Junkers and conveying factual information about certain phases of the agricultural policy under the Weimar Republic, than in its realistic recommendations to the statesmen who will write the peace.

Since the history of Germany's hereditary manorial élite, the Junkers, is almost inextricably interwoven with the fabric of Germany's history, the author had to tackle a task all the more formidable because the series of research studies (published under the direction of Professors J. B. Condliffe, Stuart Daggett, Howard S. Ellis, E. T. Grether, and Paul S. Taylor) in which it appears limited the space to less than 200 pages of text. Yet, while it cannot dig very deep, the book states the author's findings and theses cautiously and well.

The first part traces agricultural protection in the Reich since 1871 in its global contours; the second deals with the maneuvers of the Junkers against the Republic, while the third part drafts suggestions for the peace.

This reviewer does not find it difficult to give the author all the credit due, but he finds it hard to overlook the fact that in spite of

the impassionate, detached, and scholarly presentation, this book is afflicted with the ailment common to so many books of these war years. The book's underlying thesis is that since the Franco-Prussian War, Germany has pursued policies of agricultural protectionism; behind this protection stood the Junkers; agricultural protectionism and militarism went hand in hand; in order to break militarism one must break protectionism, and in order to break protectionism, one must break the Junkers.

This reviewer has always considered the political, social, and economic privileges of the Junkers in modern Germany to be an anachronism and the root of the corruption of democracy, and in Germany wholeheartedly participated in the struggle against its perseverance, with the acknowledgment of immediate dismissal by the Junkers when they joined Hitler's cabinet in 1933. Thus he has no quarrel with the author's attitude. Yet he feels that Dr. Gerschenkron failed to ask a great many questions which might have embarrassed him. However, while they would have made the going harder for him, his book would have gained immensely. It would have become much more convincing by having obtained the depth which serious doubt and self-criticism usually adds to the presentation of thought.

Writing in the United States, where protectionism is traditional and of longest standing, and the country with high protection for agriculture in spite of creditor and exporter status, the author might have asked whether it is really true that agricultural protectionism is an exclusive congenital Junker obsession or invention; or why, in the United States protectionism had nothing to do with militarism. Why have France and Switzerland both been protectionist countries for the same length of time Germany was, yet without having Junkers? And why were the Prussian Junkers as late as the sixties of the last century as hardheaded free-traders as they later became protectionists? Why did not the English Tories or the landed gentry create the problem in Great Britain that the Junkers do in Germany? Why did the United States absorb its "Junkers," the plantation-owning aristocracy of the South, into the democratic society?

Dr. Gerschenkron states correctly that the Social Democrats, i.e., essentially the Marxian labor unions, cooperated with the Junkers in shaping the food autarchy policy and in building a powerful governmental monopoly administration for agricultural

markets, but he does not show the reader that labor fortified the economic position of the Junkers in spite of its Party platform of Kiel because Dr. Baade and his labor colleagues felt that they could outsmart the Junkers by converting the entire German economy into a system of state monopolies controlled by a labor majority. The whole chapter on the Junkers vs. the Weimar Republic suffers from the fact that it relates the exploits of the Junkers as if these masters of intrique operated in a pleasant sort of vacuum. In fact, however, the Junkers were almost broken economically by the Weimar Republic, while labor and all anti-militarists lost the Reichswehr, the government's chief means of political force, to the Junkers by default. Socialists and liberals, young and old, considered it beneath their dignity to enter the ranks of the officer corps of the army, leaving the despised jobs to the Junkers.

The reader of *Bread and Democracy in Germany* might conclude that if all the Junkers had been "liquidated" in 1919, Germany and the world would now be at peace. This, however, is extremely doubtful, not because all the Germans were always plotting for war, but because a sufficient degree of social and economic distress will invariably give political gangsters and men of violence ideal opportunities for their exploits, particularly if during the years of depression, democracy has deteriorated internally.

There are many more pertinent test questions which remain unposed, and thus many more good reasons for the author's own theme are omitted. He suggests as a solution the expropriation of the Junker estates at one stroke, and the adjustment of German agriculture to the production of more animal products with grain imports under the auspices of an over-all state monopoly handling imports, exports, and domestic price-fixing. He does not prove his point that large-scale farming with hired labor is in itself detrimental to peace and welfare, and if not, how one shall exclude the Junkers from managing such farms.

The first part of the suggestion, the dissolution of the Junker estates, would be almost non-controversial if the political and economic future of Germany were slightly more discernible than it is today. Even then, however, the suggestion for separating the Junker class from its position of economic privilege is merely stating a desirable goal. The trouble begins when that expropriation act has to be executed and the complex social, economic, and technical problem has to be tackled. If the change does not come

by revolution but by legal reform, the technical procedure may again easily be the method of frustration.

As to the suggestion of operating a national agricultural state monopoly, this reviewer questions not only the wisdom of such a policy, but also the propriety of ending an otherwise thoughtful and cautious book by quietly rolling in front of the reader, without further comment, a carload of dynamite, leaving him with embarrassed speculation and mixed sentiments. To overcome these feelings the reader may want to turn to Hayek's momentous book, *The Road to Serfdom*.

These critical comments notwithstanding, the book is recommended as challenging material for seminar discussions for graduate students, and to all "students" of the German problem in general.

KARL BRANDT

Food Research Institute
Stanford University

The Wealth of the Nation, H. Clyde Filley, Lincoln, Nebraska; University of Nebraska Press, 1945. Pp. X, 174. $2.00.

Professor Filley points out in his preface the widespread popular interest in economic problems and the general lack of dependable information about them in forms suited to the needs of the lay reader. Certainly there is need for more books on economic principles that are suited to such audiences and for use in high schools. To do an adequate job on such a book is no easy task, however, and the writer of this book does not seem to this reviewer to have accomplished it. It is easy to agree with the statement (p. X) that "the book contains little that is new," but most economists who have read much of the economic literature written since 1850 will be skeptical of the statement that "It merely assembles in one place concrete data which support well-established economic theories."

The central theme, if there is one, is that "The only way by which higher living standards for the masses can be obtained is to increase the production and improve the distribution of necessary commodities" (p. 64). No one will disagree with this simple proposition, but nearly all students familiar with recent studies of economic relationships will disagree with the conclusions as to how those desirable ends are to be achieved.

The author indulges in a good many homilies on the order of

those in Poor Richard's Almanac. The nineteenth century virtues of thrift, hard work, honesty, and long hours are extolled, and apparently nearly all American pioneers are assumed to have possessed them. But there is little recognition of the fact that, under present day conditions, these virtues may not prevent the worker from being thrown out of a job, the farmer from losing his markets, or the economy as a whole from going into a tailspin. There is no comment on the fact that over-all savings may be made at too rapid a rate and that consumer buying power may be inadequate to keep productive resources in full use. The implied solution, when buying power declines, is to reduce prices and wage rates, but the probable interaction of these on consumer buying power is not discussed. High wage rates are considered a major difficulty. However, no distinction is made between wage rates and wage costs. High taxes are an unmitigated evil and, except in wartime, a result of bad management regardless of the uses to which they are put. "Governments are perpetual beggars." The corollary of this is, of course, that in areas like India, China, and some of our own states where taxes are low we may expect the most prosperous economies.

Apparently gold is considered the only satisfactory measure of the value of money. This implication appears repeatedly but with no discussion of what constitutes the value of money. "The issuance of paper currency which cannot be redeemed upon presentation (presumably in gold) is really a forced loan without interest" (p. 50); "One of the most common causes of inflation is the issuance of paper money in such large quantities that it cannot be redeemed in gold" (p. 100); "So far as history records, gold has been the most nearly satisfactory measure of value that has ever been used" (p. 151).

The most chapter, chapter IX, entitled "The Road to Poverty," presents a puzzling treatment in which the economics of individual activities is applied rather undiscriminatingly to the economics of national activities. The reader is tossed about somewhat casually from a three-paragraph discussion of "wild life" to a following single paragraph on the thirty-hour week and a succeeding short paragraph on limitation of the amount of work a laborer may perform in a day.

All in all it is the kind of book most everyone feels inclined to write at one time or another; one in which he can express opinions and air prejudices without the tedious necessity for relating them

to the prosaic "facts of life," or of bringing them into orderly sequence. To say, as the publishers do, that "The Wealth of the Nation is not too unlike its prototype by Adam Smith" would seem to be a masterpiece of overstatement.

M. R. BENEDICT

University of California
Berkeley

The Cambridge Economic History of Europe from the Decline of the Roman Empire: Vol. I, The Agrarian Life of the Middle Ages, Edited by J. H. Clapham and the late Eileen Power. Cambridge: The University Press. New York: The Macmillan Company, 1944. Pp. xvii, 750. $7.00.

This is the first volume of yet another *Cambridge History*. It was in 1899 that Lord Acton planned the *Cambridge Modern History* as a series of twelve large volumes, with each chapter written by a specialist on the subject. The success of that pioneer venture led to other historical series—the Medieval, the Ancient, the British Empire, India, English Literature and American Literature. In all, the total score is over fifty volumes in forty years, and if there is not a bedside book among them there is not a single serious disappointment to scholars.

Acton died in 1902, and his kindly shades were probably a little disturbed when he heard there was to be a series on economic history. For in 1902 economic history had scarcely taken on a distinctive shape. It was still in its first generation of teaching and research, and too much dominated in its consciousness by the controversies of the constitutional historians, the quarrels between deductive and inductive approaches to economics, and the slogans of the class strugglers. Since those days the second and the younger members of the third generation have gone far, exploring new fields, unearthing new types of material, and developing new techniques. The subject can now stand on its own merits, and does not have to try to justify its existence either as a provider of illustrations for the advocates of the economic interpretation of history or as a discoverer of examples to buttress neo-classical or paleo-classical economic theory.

The plans for the *Economic History* took shape during the nineteen-thirties, years which were not friendly toward projects involving international scholarly cooperation. I know nothing that more

grimly illustrates the impact of the last ten years on academic work than Clapham's quiet description of the fate of his collaborators. The writer of the keynote Chapter I was a professor in Breslau who had to transfer himself to Jerusalem. The Italian who was to write about his country "was unable to deliver the MS." He was replaced by a Dane, who "unexpectedly died." His successor was a Finn, who finished the job and was last heard from "somewhere in Finland" in late 1939. The Spanish contributor sadly threw up his task because he was a refugee in Santander and his notes were in Seville. "There has been no later news of him either." Of the Pole "all that can be said with certainty is that he cannot be at his University of Poznan." What has happened to two Russians who had found refuge in the University of Belgrade "we do not know." To crown this list of disasters it need only be added that Eileen Power, one of the greatest medieval scholars of our time, completed her editorial work and then dropped dead in the doorway of a London store; and that a great part of the first British printing was destroyed by "enemy action" in 1941. The British editions have been printed on poor paper, but the American edition which appeared last year is on paper of far better quality.

To readers of this JOURNAL the outstanding merit of this volume lies in the fact that here for the first time—in any language, so far as I know, we have the early agricultural history of all Europe. In the past, medieval rural society has usually been treated by describing "the typical manor," and letting it go at that. This was as improper as it would be to describe a Virginia plantation or a New England forest clearing or a Kansas wheat farm or a bit of dust-bowl and then say, "That is the American rural landscape." The manor was not fully representative of all England, and it certainly could not be expected to serve as a good economic, social, and political pattern for all parts of Europe. Conditions of soil and climate and contour, of history and traditional customs, of terrain and techniques, of methods and of marketing opportunities, of old-established settlement or of recent pioneering invasion, all these and many more factors have to be considered; and it is only within recent decades that the economic historian has given them due attention. Even today his interests may be confined to what he can see in documents,—to lords and serfs and social institutions; but in an increasing number of cases he has gone out and got mud and manure on his boots, with highly fertilizing consequences.

These two features—the continental survey and the attention to farming conditions—characterize much of the volume. To them can be added a third. It would be hard to say how far our American "frontier theory" has influenced European scholars; but it is true that they have tried to start out with a Europe that was unoccuppied over vast expanses. Hence the first chapter fittingly deals with "the settlement and colonisation of Europe," and many later sections look at men migrating to the European frontiers centuries before their descendants moved to the American edge of settlement. The second chapter deals with agriculture and rural life in the later Roman Empire and the third is called "The evolution of agricultural technique." Finally, when we have looked at every part of Europe, studying medieval agrarian society "in its prime," the story of that society "in transition" is told not merely in terms of the changing systems of tenure and government but also in relation to the effect of wider clearings of land, of the growth of a money economy, and of developments in methods of production or marketing.

When the book first appeared in 1941 its editor and publisher could offer little hope that the remainder of the series would see the light for many years to come, or would ever appear at all. Come the deluge if it must, at least Volume I was out, and was complete in itself. Today that grim outlook has been in part dispelled, and Sir John Clapham finds time to think about the possible treatment of the modern story. But there are still two more medieval volumes to appear, and only a few chapters had been written for them by 1939. Whether the team of scholars who were doing the work "can be brought together, or replaced, and when, one cannot yet tell." We may earnestly hope that they can be. Meanwhile the appearance of the first instalment is an event of first class importance to all who are interested in the history of agriculture—and in the story of human courage.

HERBERT HEATON

University of Minnesota

Demobilization of Wartime Economic Controls, John Maurice Clark. New York: McGraw-Hill Book Company, Inc., 1945. Pp. xii, 219. $1.75.

This is the third of the research studies of the Committee for Economic Development into problems of the transition from war to peace. Inevitably it covers more ground than the title indicates, for it is impossible to discuss the demobilization of controls without

many side glances at the whole problem of the transition. With the general moral of the book—that controls should not be lifted until the need for them has disappeared, and that the need for controls is likely to last for a considerable period after the conclusion of hostilities—few will disagree. Many valuable practical proposals are set forth, relating to such items as the termination of contracts, the disposal of plants, rationing, controls of manpower, price and wage control, and so on. The problem is considered from the point of view of three broad periods: the period of future fighting, the initial postwar conversion, and what the author calls the "catching-up" period, when the unfulfilled demands of the present are made good. This is followed by a glance at "controls in a longer perspective."

Any work of this type is bound to suffer from a plethora of "ifs and ands," and the attempt to present all possibilities fairly can easily lead to a morass of doubtful alternatives where the reader flounders helplessly. The presentation unfortunately suffers even more from this defect than seems to be necessary. The book would have been much improved if the author had had a clearer view of his reading public. Those who are familiar with the problems involved will find much of the work trite. Those who are not familiar with the problems will find great difficulty in following the argument in many places, because the author assumes that the reader has a good deal of specialized knowledge at the start. The reader who is not familiar with the present operations of wartime controls will emerge with no clear picture of what it is that has to be demobilized. What is the use, for instance, of saying (on p. 87) apropos of allocating quotas to pre-war producers. "The figures for the domestic laundry equipment industry are very instructive on this point," without giving the figures? Is the reader supposed to carry this titbit of information around in his head? Surely, also, the book should have been pruned of such gems of platitude as the sentence on p. 134: "Disposal of plants by sale or lease should be as speedy as is consistent with due deliberation, wrong disposal being a serious matter."

There is practically no discussion of agricultural problems, apart from an occasional cursory paragraph, which would seem to be a serious omission, for here, more perhaps than in any other area, the immediate post-war patterns have been already set by congressional action.

K. E. BOULDING

Iowa State College

Readings in Business Cycle Theory. Selected by a Committee of the American Economic Association. Philadelphia: Blakiston & Company, 1944. Pp. xvi and 494. $3.75.

This volume, second in a series of republished articles in economics (of which the first was "Readings in the Social Control of Business," 1942), is designed primarily for teaching graduate and advanced undergraduate courses. The selection of articles is such, however, that professional economists who wish to keep abreast of developments in fields other than their own can scarcely afford to be without this volume. Here, for example, we find a brief presentation by their exponents of the cycle theories which have come to be associated with such well-known scholars as Wesley Mitchell, Schumpteer, J. M. Clark, Hayek, Hansen and Hawtrey. Here, too, is a penetrating synthesis of recent trade cycle controversy by D. H. Robertson, whose remarkable ability to get to the core of things has long been recognized. While Lord Keynes does not appear as a direct contributor, his ideas and the controversy which they have provoked are, at least, a point of departure for the selections in two of the central portions of the book.

The plan of the book was to select outstanding contributions to cycle theory without special reference to the time when these contributions appeared. Actually, this selection carried the committee back to 1917, when J. M. Clark first elucidated his famous principle of acceleration and forward to 1941, with the publication of John H. Williams' penetrating, though rather gloomy comments, on the efficacy of deficit spending. Wesley Mitchell's original exposition of his well-known pattern of the business cycle was in 1913, though the particular exposition chosen for this volume appeared somewhat later. For the United States, at least, Mitchell was a pioneer in the field of cycle research.

After Part I, which deals with an over-all picture of the business cycle, and contains compact presentations of the points of view of Schumpeter, Kondratieff, Mitchell and Tinbergen, the book comes quickly to two sections which were largely born of the writings of Mr. Keynes, particularly in the *Treatise on Money* (1930) and then in the *General Theory of Employment, Interest and Money* (1936). The first of these sections summarizes the famous investment-savings controversy of a few years ago. The second deals mainly with the impact of Mr. Keynes on public policy, being concerned with the multiplier and acceleration principles (the latter being Clark's

contribution) and their implications for government spending.

From the vast literature on the savings-investment controversy, the Committee selected four articles. One, by Ohlin, summarizes the approach of the Swedish school, two are designed to clear up definitions, assumptions and objectives of the various major contestants (these are by Friedrich Lutz and A. P. Lerner) and the last is the celebrated Lange article of a few years ago on "The Rate of Interest and the Propensity to Consume." This article accomplishes three main things: (1) it presents the essentials of the Keynesian system, giving the rate of interest a more important role to play (2) it indicates that many of the elements of the Keynesian system were present in the Walrasian system of general equilibrium (3) it defines the theoretical conditions under which the optimum propensity to save (or alternatively, optimum propensity to consume) may be determined and indicates some implications of this for monetary policy.

In the section on the multiplier, acceleration principle and government spending, the "usability" of the multiplier concept for public policy is critically examined in a number of excellent articles by Fritz Machlup, Paul Samuelson and J. M. Clark and others.

Although, as the Committee points out in the introduction, "monetary theories of the business cycle are no longer so much in vogue as they were ten years ago," a section is included which contains Mr. Robertson's acute analysis, already referred to, which extends beyond the monetary field itself, and clear representations of the theories for which Hawtrey and Hayek have come to be well-known.

The book concludes with two short sections, one on under-consumption and secular stagnation, the other on special commodity cycles. The first of these contains, among other articles, the best short account of the views of Alvin Hansen which is in print. The last is simply Ezekiel's well-known "Cobweb Theorem" outlined a few years ago. Professor H. M. Somers has compiled an exhaustive bibliography at the end of the book. Readers are informed that the next volume of republished articles will deal with distribution and the national income and are invited to send in suggestions for future volumes to the secretary-treasurer of the American Economic Association.

EDWARD D. ALLEN

Iowa State College

NEWS NOTES

R. L. Adams, Professor of Farm Management at University of California, is on leave of absence until June 30, 1945. He accepted the directorship of the California Farm Production Council for the period August 1, 1944 to June 30, 1945.

Norris J. Anderson, formerly associate professor at Kansas State College, has returned to his former position after a period of employment by a bank in Colorado.

Lieutenant William E. Bell, on military furlough from his position as Agricultural Economist on the staff at Upper Darby, Pennsylvania, has been reported a prisoner of war in Germany.

William Bredo, formerly Agricultural Economist, Distribution and Planning Branch, Commodity Credit Corporation, War Food Administration, has transferred to the Division of Marketing and Transportation Research as Agricultural Economist.

W. M. Bristol, graduate of the University of Connecticut, and formerly with War Food Administration as Milk Marketing Specialist, Office of State Milk Administrator, State of Connecticut, is now Assistant in Agricultural Economics, Agricultural Experiment Station, State College of Washington, Pullman, Washington.

H. C. M. Case, head of the Department of Agricultural Economics, University of Illinois, is now in London, England, with the agricultural planning division of the United Nations Relief and Rehabilitation Administration.

Orvel H. Cockrel, formerly Agricultural Economist, Division of Marketing and Transportation Research, resigned to accept a position as teacher of agriculture under the Smith-Hughes Act at Caneyville, Kentucky.

Ralph L. Dewey, Principal Transportation Economist in the Marketing Facilities Branch of W.F.A., resigned April 1 to accept a position as Professor of Economics in charge of teaching and research in transportation in the Department of Economics and Sociology at Iowa State College.

R. C. Engberg has been appointed Chief of the Economic and Credit Research division in the Farm Credit Administration, Kansas City, Missouri. Dr. Engberg was formerly Director of Research in the Farm Credit Administration of Omaha.

Delbert R. French, formerly Price Analyst, Services and Foreign Trade Price Division, Office of Price Administration, has transferred to the Division of Marketing and Transportation Research as Agricultural Economist.

William A. Green, a veteran of this war, has been employed as Agricultural Economist with headquarters at Lincoln, Nebraska. Mr. Green is a graduate of the University of Nebraska.

Lt. Colonel H. W. Hannah, on leave from his position as assistant professor of agricultural economics, University of Illinois, was severely wounded in Holland, while on active duty as operations' officer of the 82 Airborne Division. He is now in Billings Hospital, Fort Benjamin Harrison, Indianapolis.

Harvey W. Hawthorne, Agricultural Economist in the Division of Farm Management and Costs, Washington, D. C., retired at the end of January after 31 years of continuous service in farm management research. Mr. Hawthorne expects to complete summarization of the labor costs in relation to total costs as reported in State and Federal publications.

Robert R. Hays, Agricultural Economist, has transferred from the Appalachian regional office to the Federal Crop Insurance Corporation at Washington, D. C.

Hugh A. Johnson has resumed work in the Division of Farm Management and Costs, after a year at the University of Delaware and is stationed at the Division's regional office in Milwaukee, Wisconsin.

Arthur B. Jebens, who prior to his transfer to the Federal Housing Authority was a Legislative Analyst on the Washington staff, has been reported missing in the European theatre.

Phillip E. Jones, Agricultural Economist, has been transferred from Atlanta, Georgia, to Albuquerque, New Mexico.

William Kling, formerly Agricultural Economist, Distribution and Planning Branch, Commodity Credit Corporation, War Food Administration, has transferred to the Division of Marketing and Transportation Research, as Agricultural Economist.

Howard W. Mayne, Agricultural Economist at Milwaukee, resigned last September to enter the Armed Services. He is now with the Army Air Corps.

Lt. (j.g.) William F. Musbach, on military furlough from his position as Agricultural Economist on the Washington staff, died January 21 at the Naval Hospital, Bethesda, Maryland.

Aaron G. Nelson, recently Agricultural Economist in the Division of Farm Management and Costs at Washington, D. C., has been appointed Director of Research, Farm Credit Administration, Omaha, Nebraska (effective April 16, 1945).

Alvan D. Oderkirk resigned from his position of Assistant Professor of Agricultural Economics at Iowa State College March 1, to engage in a commercial poultry project near De Kalb, Illinois.

Frank Robotka of Iowa State College is temporarily at the Brookings Institution, Washington, D. C., under a collaborative arrangement be-

tween the two institutions, to continue work on a study of the economic nature of the co-operative form of business organization.

Stanley K. Seaver, Assistant Professor in Agricultural Economics, University of Connecticut, is on leave of absence to work for the War Department in Washington, D. C.

Geoffrey S. Shepherd, Professor of Agricultural Economics at Iowa State College, received a five months' leave of absence beginning March 1 to accept a temporary position of Chief Economist for the Food Price Division of O.P.A. in Washington, D. C.

Irving A. Spaulding has been appointed to the position of Associate Rural Sociologist in the Department of Agricultural Economics and Rural Sociology at Clemson College, Clemson, South Carolina.

Henry H. Stippler, Agricultural Economist, is now representative of the Division of Farm Management and Costs at the Portland, Oregon, regional office.

J. M. Tinley of the Giannini Foundation and Division of Agricultural Economics at the University of California has been promoted to Major. He is now in London, but has seen service in Holland, France and other countries on the continent.

Elbridge A. Tucker, Agricultural Economist, Division of Farm Management and Costs, is now located at the Division's regional office of Berkeley, California, by transfer from Atlanta, Georgia.

Frederick V. Waugh, Assistant Deputy Director of the Office of Marketing Services of W.F.A., spent a month this spring at Iowa State College as visiting Research Professor in the Department of Economics and Sociology studying food marketing in the state.

Francis J. Weiss, formerly Technical Consultant with the National Planning Association, has been appointed Agricultural Economist with headquarters at Washington. Mr. Weiss was educated in Vienna, and received the degrees of Ph.D. and Sc.D. from the University of Vienna.

Edwin E. Wilson, Agricultural Economist, has been transferred from Berkeley to Washington, where he will assist in the assembly and analysis of changes in major land uses.

E. Peter Winter, who received his Master's degree in Agricultural Ecomnomics at Colorado State College, has joined the staff of the Division of Marketing and Transportation Research as Agricultural Economist.

E. J. Working has returned to the Department of Agricultural Economics, University of Illinois, after spending some months in research work for the Mutual Life Insurance Company of New York.